IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication DECEMBER 8, 1960

Hanson Carroll

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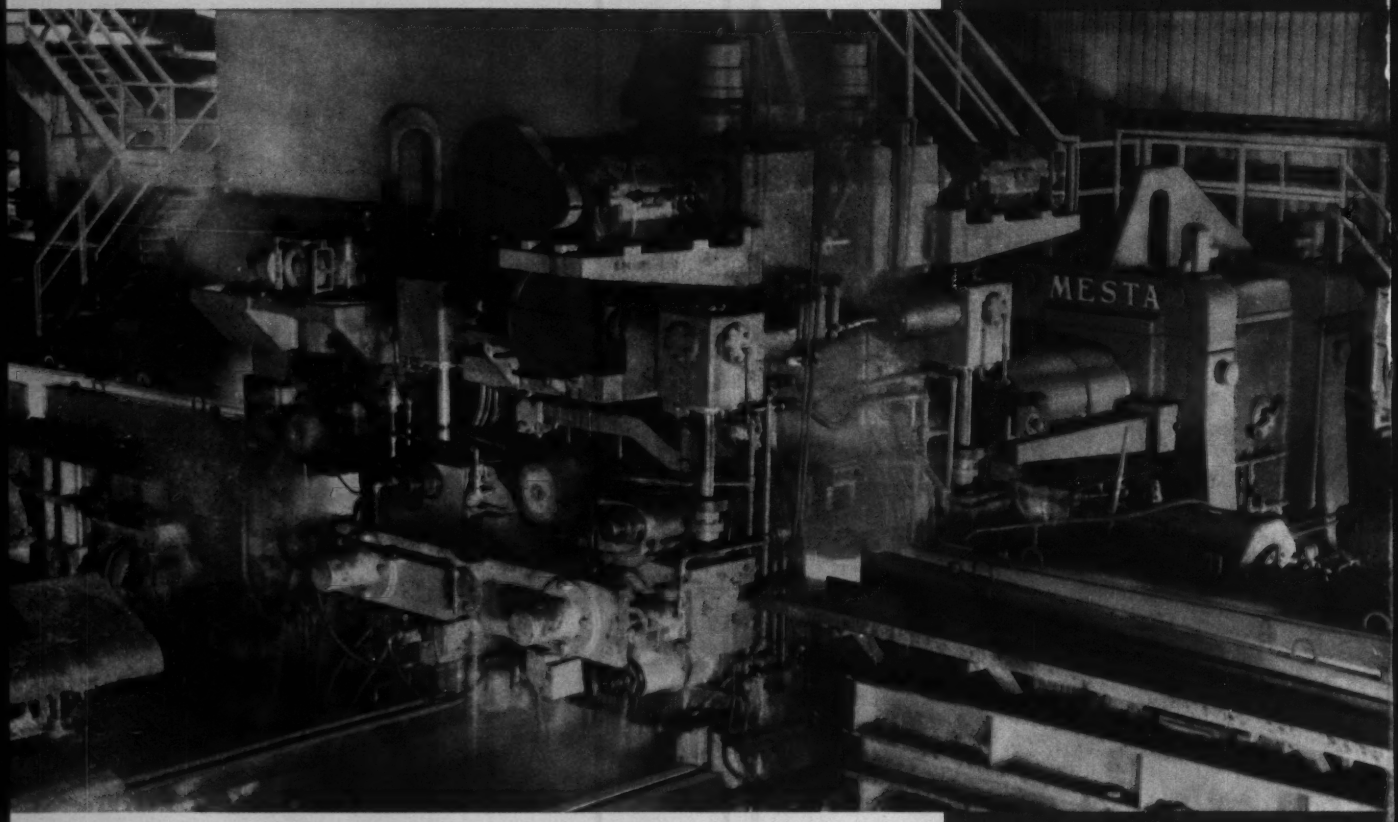
New Processes For Machining Metals p. 109

Can Unions Win in the Office? p. 79

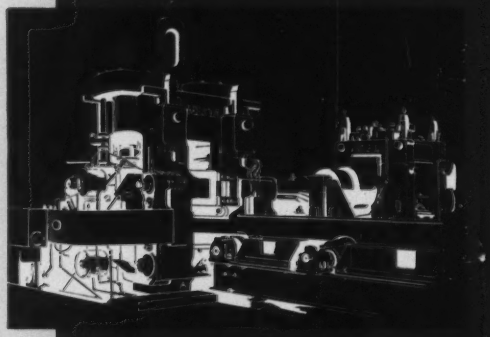
How Fast Can the Economy Grow? p. 89

Digest of the Week p. 2-3



WIDE FLANGE BEAM AND STRUCTURAL MILLS

Designed and Built by MESTA



Designers and Builders of Complete Steel Plants

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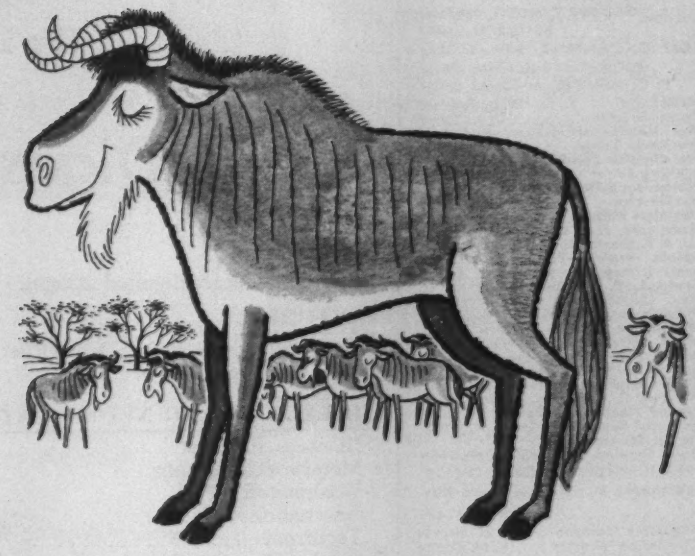
The Gnu who Gnew it all



In far-off Africa, there once lived a gnu named Hugh. In most respects he was a good gnu —and there's no gnus like good gnus.

But one day Hugh went to Uncle Gnuton, the leader of the herd. "Say, unc," said Hugh, "we been eating out here on the veldt all these years. How about we try the jungle for a change? I hear they got mighty tasty tidbits in there."

"My boy," replied the wise old bull, "there are better ways to direct your spirit of adventure. There's danger in the jungle. Take my word for it, gnus are better off out here on the plains."

Hugh was not convinced. That evening he stole away to the jungle, and was soon gorging himself on tender shoots. "Hah," he thought, as he chomped greedily, "before they wise up I'll have the lion's share."

He was wrong. A few moments later he was the lion's share.

Whether your needs be tender shoots or steel, your safest, most reliable suppliers are right here at home. Remember, no one knows the needs of American steel buyers better than American steel makers. To serve you, and serve you well, is our primary concern—not just today and tomorrow—but year after year.

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The IRON AGE

December 8, 1960—Vol. 186, No. 23

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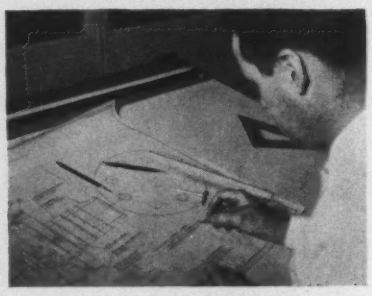
WHITE-COLLAR UNIONS

Slow Headway—Unions have had setbacks in efforts to unionize salaried workers. But unions recognize



urgent need for white-collarites and are mounting new attacks. P. 79

STEEL LABOR

No Progress — The joint work rules committee of the USW and steel industry has little to report. The two sides can't even agree on a neutral member. There is little outward softening of positions. But there are some signs of a shifting of emphasis. P. 81

DIVERSIFICATION

Always Best?—Many companies are moving into new fields in order to spread risks of business. But is it always the best thing to do? One company is shedding unrelated operations and concentrating on the metals field. P. 83

SERVICE BUREAUS

For Small Companies—More and

Metalworking

Cover Feature

SPECIAL MACHINING — Spend your "Special Machining Dollar" wisely and you'll be ready for the challenges of the future. Plasma flame, a special machining process, knives through refractory metals at Thermal Dynamics Corp. P. 109

more small companies are utilizing electronic data processing service bureaus. Many find distinct advantages to this service. P. 84

THE GROWTH RATE

How Much? — What rate of growth should the economy reach to meet our national goals? What can be done to make our economy more effective? The second of a series on the National Goals Commission's report being made to the president. P. 88

Engineering-Production Developments

HOW TO GET MORE FROM SPECIAL MACHINING

Overcome Barriers—Metalworking changes are piling up at a bewildering rate. Conventional machining technology lags behind these new developments. As a result, special machining methods are being called upon to fill the gap. P. 110

Greater Design Freedom — The marriage of ultrasonics and abrasives has produced a powerful production tool. This hybrid shapes materials which designers previously rejected as unmachinable. It also permits the use of solid sections instead of split components. P. 112

Eliminate Deformation — Most machining methods cause plastic deformation in the work material. Electro-machining processes preclude this deformation by using electrical energy in lieu of mechanical force. P. 115

Heat Contours New Alloys—Metals and alloys that can't be cut by conventional methods are becoming familiar problems. High heat yields an answer. It's available in three major forms: tungsten arc, electron beam and plasma jet. P. 118

Remove Excess Weight—If you're looking for a way to shape complex contours in hard-to-reach areas, try chemical milling. It can also be used to pare off excess, unwanted weight while improving the surface finish of a part. Immersion in a controlled acid-type solution etches the prepared parts. P. 120

Consider Costs—When you choose a machining process for a specific job, there are many factors to consider. Usually, economic details are the most compelling. Special methods can pay off on many metal working jobs. P. 123

Market and Price Trends

MOLY USES UP

Wider Market—Molybdenum has moved beyond its traditional market as an alloy for steel. Now it is used in paints, missiles and electronics; as well as other uses. P. 82

AUTOMOTIVE

Two on One—Pontiac is able to build both its big car and compact on the same assembly line at the same time. Some unique design features of the compact make this possible. P. 93

MACHINE TOOLS

Case for Inserts—A while ago, industry was ready to adopt throwaway milling cutters. What happened? Design has moved ahead and finer finishes are possible. P. 97

STEEL SUMMARY

Some Hope—It looks like January may show the first improvement since last June. Big factor is indication by automakers of improved steel buying in January after December's low point. P. 153

PURCHASING

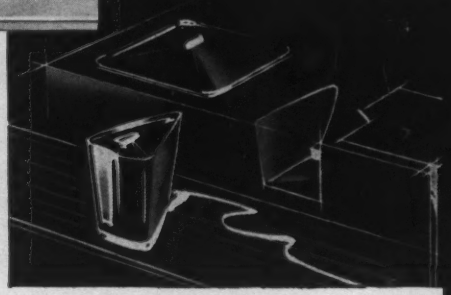
Oven Sales Still Slow—The industrial oven industry is in a bogged down status. Sales this year moved sideways and in some cases even dropped. The outlook for 1961 isn't very promising. P. 154

NEXT WEEK

JOB EVALUATION

Needs Attention—Job evaluation programs often fail because top management fails to follow through. Next week, John A. Patton, a leading expert in the field, tells how to use this tool to determine equitable wage relationships.

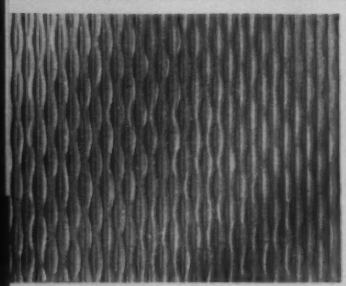
Steel



TEXTURES IN STEEL

• *Steel* is truly the designer's metal. Evidence of this fact is this modern kitchen caddy designed in Sharonart® by Sundberg-Ferar.

The textured beauty of Sharonart® can be produced in an almost limitless number of patterns. This permits easy model changing. It's easy to clean and will not show wear. It can be painted, plated, or vinyl coated with beautiful results. *Sharon Steel Corporation, Sharon, Pa.*



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To Be Stout-Hearted Is the Order of the Day

You and I — meaning our nation — are in trouble. It is clear that the greatest nation on earth has dollar troubles.

In simple language, our friends and allies have lost confidence in our ability to pay our bills. It is unnecessary to argue about our foreign aid program. It must be revised. The point is: We are losing gold because we send more money abroad than we receive from abroad.

Along with this financial crisis is an over-all lack of confidence generated by our troubles. It will be difficult for us to rebuild confidence. We must take harsh measures.

When our Pandora's box of international troubles is completely opened, we will see how deep are our difficulties. We will come out of this right-side-up, but the events ahead involve every man, woman, and child. The longer it takes us to realize this, the tougher the correction will be.

Our overseas crisis will have to be mitigated by actions we take at home. To demand more of the things which caused us to be so loose in our international pocketbook philosophy will only sink us deeper in the mire of complexities.

Business is suffering from a recession and a profit squeeze. But the squeeze started before the recession. The world trend is for a halt to inflation, for quality at lower prices with a competition unheard of before.

The public is not yet aware of what demands may be made on its courage. Mr. Kennedy is not likely to tell them in blunt terms what this is until he takes office. What the present Administration has said and will say will be taken as sour grapes coming from lame ducks. We may meander for quite a spell—unless we face facts instantly.

The honeymoon was over long ago. The piper whom we have followed so slavishly is presenting us with his bill. Some of it may be paid in loss of integrity unless we realize that our future as a people is at stake.

Drastic measures will be taken. Foreign aid will be revamped and questioned—as it should be. Stop-gap measures will be adopted to protect the dollar. Expediency may be a major factor—for awhile.

But in the end, all of us will have to clean house of mirages, mirrors, and easy solutions. Only the stout-hearted will be able to turn the current warnings into a long-range rescue plan for our nation.

Tom Campbell

Editor-in-Chief

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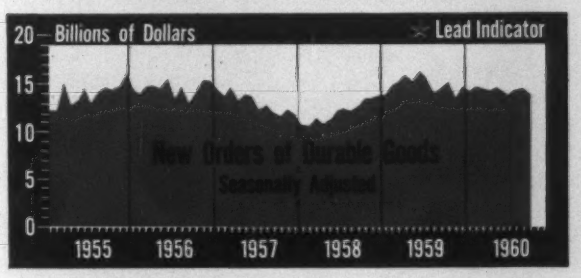
Lead Indicator Points Down

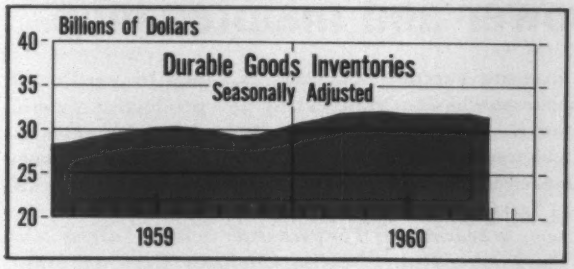
An important lead indicator turned downward in October. Business optimists were jolted as new orders



for manufactured goods declined more than $1 billion on a seasonally adjusted basis during October. For durable goods makers new orders were down to $13.8 billion, below the $14.6 billion of September.

The news is discouraging for two reasons: (1) The rate of new orders is closely watched as declines in the rate precede drops in sales, (actually shipments on orders). (2) Most of the October decline centered in the durable goods industries, destroying gains in orders made in August and September.

While new orders dropped off in October, so did sales and inventories. The dip in manufacturers' inventories last month was $400 million, seasonally adjusted, compared with a reduction of about $300 million in September (see chart). Again, durables were the area most affected. Reduction of stocks continued in metals producing and using industries, especially



automakers and fabricators.

The third indicator dropping in October was manufacturers sales, continuing a slide begun last spring. Sales of durables for the month were $14.1 billion, compared with $14.4 billion in September.

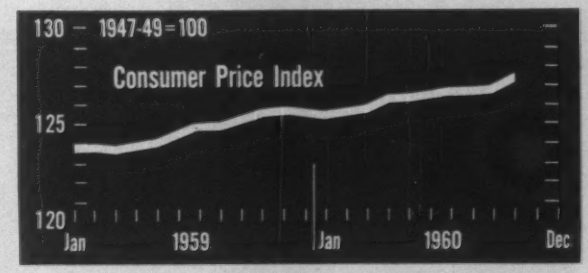
Hopeful Sign: Auto Scrap Prices

Those looking for reasons for optimism can point to recent strength in auto scrap prices. In many areas, November sales of auto scrap brought prices equaling or topping those of October. This was encouraging, following a sharp downward break in prices in October and the recent downward trend of the market.

Prices Keep Edging Up . . .

Any attempts to hold prices down will prove difficult. Prices continue climbing even in the absence of widespread price increases. In October, the Consumer Price Index was 127.3 pct of the 1947-49 average for a new all-time high in the cost-of-living. (See chart). This was the largest increase since last April. It was also the ninth time in ten months the Index had gone up.

Major factors responsible for the advance: Increases in some food prices, higher prices for new cars, most elements of housing, and some articles of clothing.



Prices of durables rose 0.8 pct, the first advance for this group during 1960.

. . . But Earnings Also Rise

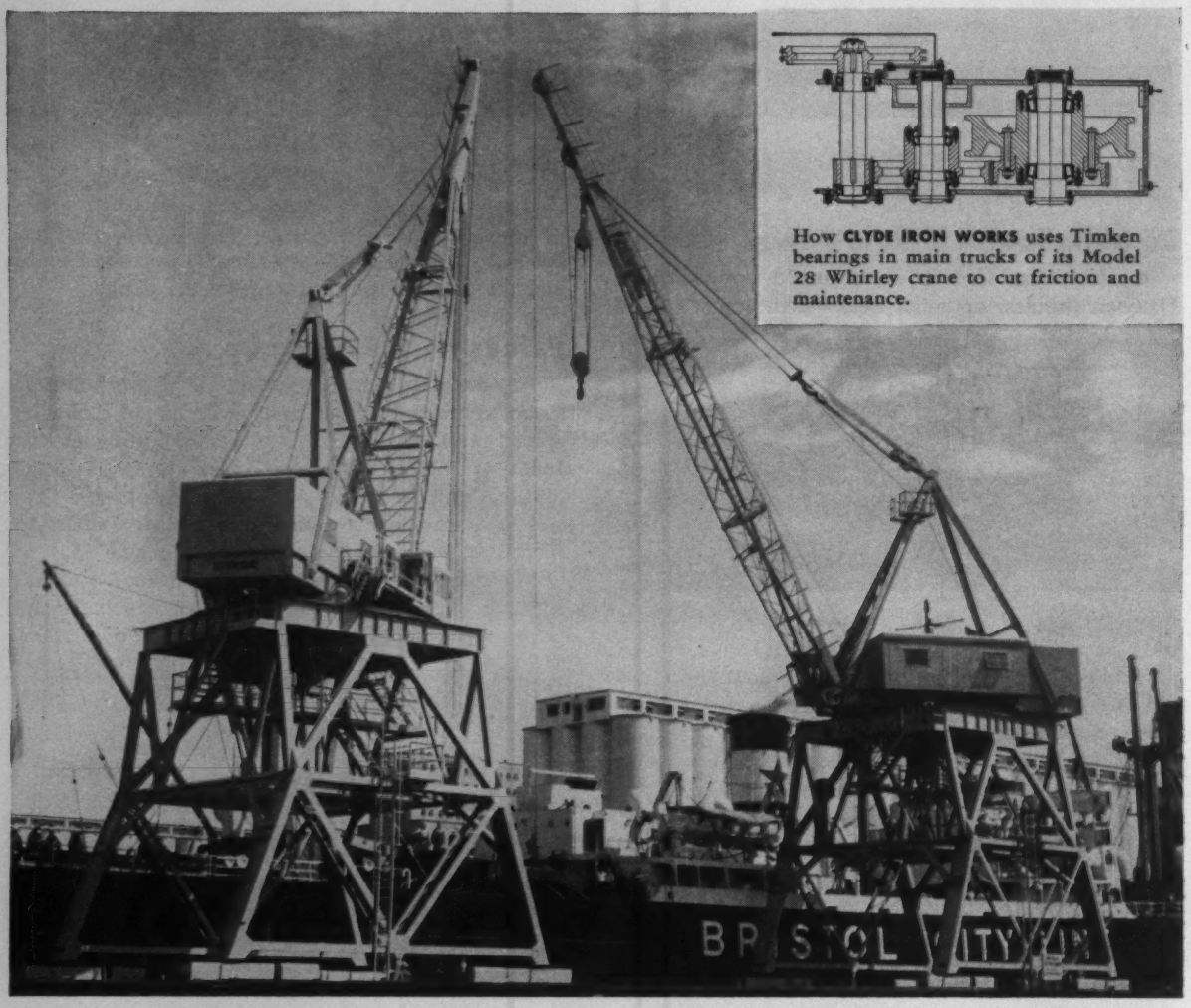
But despite this rise in consumer prices, the buying power of factory workers' earnings was slightly higher in October.

For a worker with three dependents, spendable earnings (earnings after taxes) increased to $81.50 a week, up about 50¢. The gain was partly the result of longer hours of work and rising employment in the auto industry during the October spurt in production.

Both spendable earnings and their buying power were at record highs in October. Earnings were about 2 pct above year-ago levels. An increase of 10¢ in hourly earnings more than offset a decrease of 0.7 hours in the work-week.

Buying power, which has been below year-ago levels since March, topped the October, 1959 figure by about .5 pct this year.

Nearly 1.1 million workers are due to get wage rate increases because of the rise in the Consumer Price Index or similar indexes for individual cities. Wages of another half million workers in the steel industry are also tied to the October boost in the cost of living.



How **CLYDE IRON WORKS** uses Timken bearings in main trucks of its Model 28 Whirley crane to cut friction and maintenance.

68 TIMKEN® bearings give giant cranes more sensitive control, save power and maintenance

FIRST cranes of their type to use Timken® tapered roller bearings in propelling trucks, these Clyde 90-ton Whirleys roll easier with less power. And 20 Timken bearings at other vital points permit sensitive control, cut maintenance because they . . . 1) *Practically eliminate friction.* They're geometrically designed and precision-made to roll true. 2) *Take all loads.* The taper lets Timken bearings take *both* radial and thrust loads. Full-line contact between rollers and races provides extra capacity.

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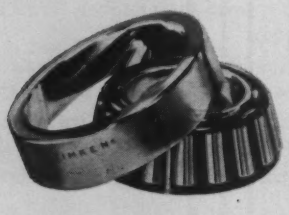


Industry rolls on

TIMKEN®

tapered roller bearings

NLRB: Expect Changes To Lean Toward Labor

The National Labor Relations Board will undergo a quick conversion under President-elect John F. Kennedy. Union leaders expect to get a friendly NLRB.

The board, which has leaned to management under the Eisenhower Administration, will switch its leanings to labor. The appointment of liberal Democratic board members and the probable switch from a Republican to Democrat chairman seem to insure it.

The board now has three Republicans and two Democrats. Kennedy appointments (two by next August) will put the lineup of the NLRB at four to one in favor of the Democrats.

Teamsters: No Trade From Auto Salesmen

The Teamsters are not proving successful in their bid to organize auto salesmen. So far, the union has lost 14 consecutive NLRB representation elections. The union has petitioned the NLRB to conduct 71 elections.

Another union, the Salesmen's Guild of America, is also proving less than successful in organizing Detroit auto salesmen. The Detroit-based independent union, organized last June, has filed 31 petitions with the NLRB to conduct elections among auto salesmen. So far, the Guild has lost six of eight elections and has dropped out of another.

C-O-L: Record Living Costs Bring Pay Hike

Wages of about 1.1 million metalworkers are going up, following the government's report that the cost-of-living index rose 0.4 pct in October to a new high of 127.3 pct of the 1947-49 average.

About 975,000 workers will get 2¢ more per hour. Most are in the automotive and farm equipment industries. Another 80,000 or so workers get a 1¢ increase. These are mostly in the farm equipment and aircraft industries.

The 2¢-an-hour increase will boost the c-o-l allowance to 17¢ for the Dec.-Feb. period for about 600,000 autoworkers at the five major companies. At the same time, salaried workers will get a $10 increase, to $85, for the quarter.

Whether steelworkers get a raise is a question that will probably have to be settled by a third party. USW and U. S. Steel Corp. can't agree on whether insurance costs have risen enough to wipe out 3¢ an hour provided in the contract for c-o-l.

Walsh-Healy: Ask $1.43 For Furniture Workers

A minimum wage of $1.43 an hour has been proposed for the metal business furniture industry. The new wage would be 33¢ higher than the present minimum, but 11¢ less than unions have asked.

Secretary of Labor James Mitchell proposed the new rate, under provisions of the Walsh-Healy public contracts act, after nearly a year of study.

USW: Why Committee Failed

The union-management report on the local practices issue in the steel industry was a gigantic anti-climax. No one expected any progress, nor real ideas for any agreement **(see p. 81)**

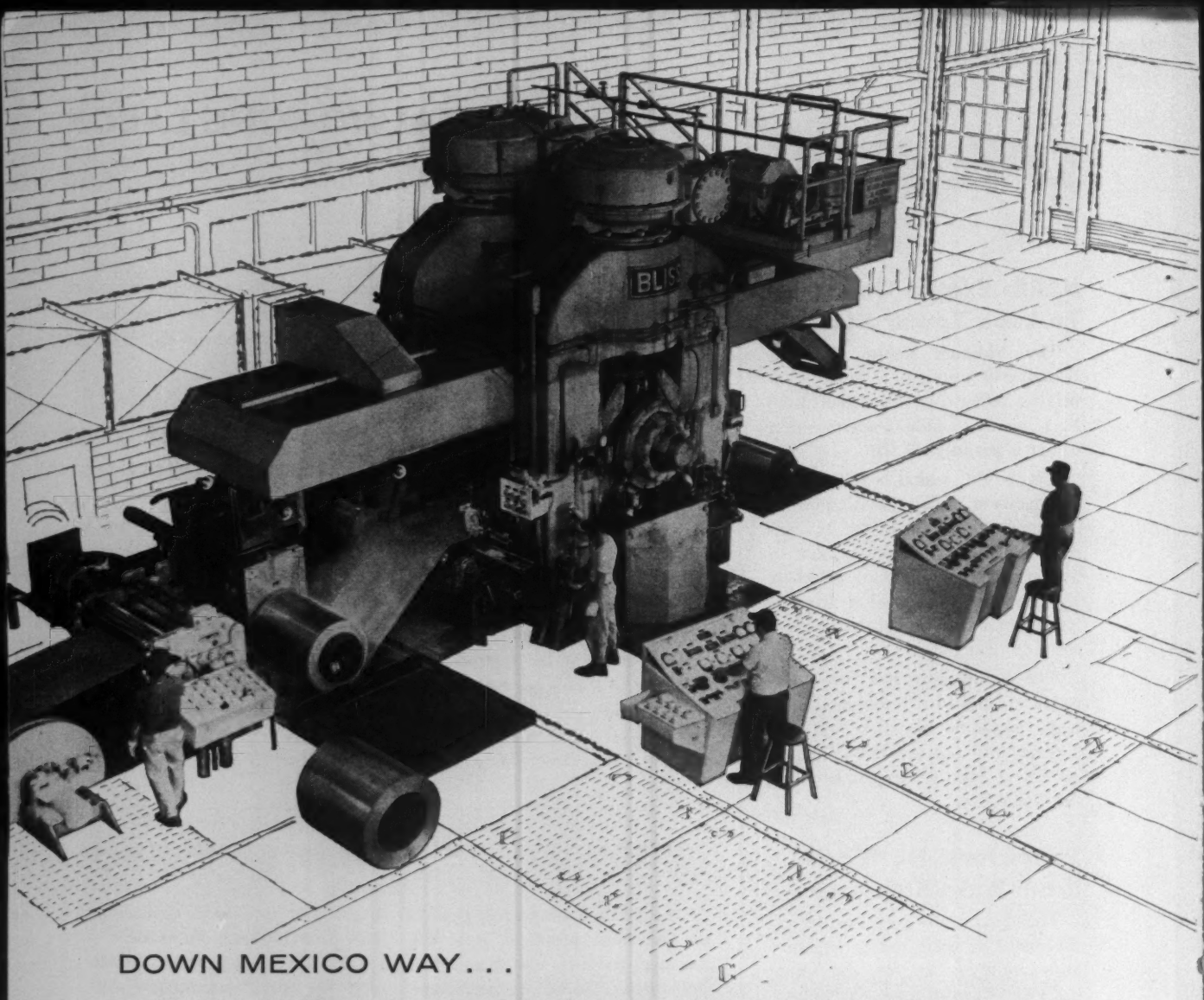
So what next? Probably not much—at least until the next contract negotiation period gets hot early in 1962. Considerable differences exist between the union and the steel companies—and there are differences, private, of course, between some of the steel firms.

It is no secret that several steel officials believe now, and have believed for some time, that the local practices problem (2-B section of the contract) is purely a local matter. There are so many different conditions between companies and between plants within companies that no overall, or unilateral, agreement will probably ever be made.

The 2-B local practices hassle will be settled eventually. But probably not by the so-called joint committee. The union will continue to use its committee as a tool to bargain for limitations on new equipment and new techniques where the union fears layoffs and job changes will be substantial.

The question of a mutual chairman is in never-never land. The union usually wants people it knows from experience will take a "broad" labor or liberal viewpoint.

The steel firms are old hands at checking on back decisions of such people so they will resist such appointments. There appears to be no chance of agreement in this area.



DOWN MEXICO WAY . . .

New Bliss mill ups steel production 25% in one year

Recently, a new Bliss four-high reversing cold mill went into action at Hojalata y Lamina, S.A., Monterrey, one of Mexico's largest producers of strip and sheet. Here's what one of their major executives has to say about it:

"With this Bliss mill, we can handle strip up to 37" wide, as well as tin plate and sheet at speeds up to 1750 fpm. In 1959, we turned out over 176,000 tons. This year, we're sure to pass 220,000."

With a 14½" and 44" x 42" roll arrangement, the mill reduces mild steel between #27 and #35 gages, turning out raw materials for such end products as metal furniture, pipe and beer-bottle caps. Accessories include: two tension reels capable of handling coils up to 15,000 lbs., coil buggies with rigid, welded-steel frames, cone-type payoff reel, quick-opening flattener and feeder, and roll-changing equipment.

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Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio

★ Push for Price Controls

The election of John F. Kennedy has brought Federal regulation of industry pricing policies closer than ever to reality.

Pre-election whisperings of new Federal pricing controls have turned into post-election loud talk. For basic industries such as steel and autos, the loud talk is dangerous.

The danger lies in legislation.

Such legislation would require industry to give advance notice of price increases to government agencies. It would require industry to defend the price increases at public hearings—before the increases were made.

Under Sen. Kennedy, proposed laws to give the President World War II-type standby price and wage controls for use in any "national emergency" also have a better chance of passage.

There is feeling in Washington that the President-elect's plans for reorganization of Federal regulatory agencies may include asking Congress for pricing controls.

Before the election, Sen. Kennedy's office soft-peddled the "administered prices" plank as nothing for industry to worry about. In October, Democratic National Committee chairman Henry Jackson told The IRON AGE that Democrats would only investigate the "nature, prevalence, and importance of administered prices."

This soft talk has hardened.

Some indication of Kennedy Administration feeling now may be found in the ideas of John Kenneth Galbraith, a top Kennedy economic adviser.

Mr. Galbraith, a Harvard economics professor, says the competitive ability of any industrial company depends on "efficient and low cost supply of steel." And he claims that in recent years the nation's steel prices have been "uncompetitive."

He calls for a major effort to halt "the constant upward thrust of our industrial prices," particularly steel prices.

■ Lame-Duck Budget May Hit Kennedy Plans

The conservative coalition in Congress, already preparing to battle liberal programs of President-elect Kennedy, will be given some ammunition by President Eisenhower.

The ammunition will be Ike's lame-duck budget. A balanced budget with federal aid programs scaled to the bone, which Ike plans, will make the new President's proposed outlays look like deficit spending. It will give Republicans and Southern Democrats an argument against Kennedy's spending plans.

There is no doubt that the conservative coalition is prepared to fight. Republican leaders already have met with conservative Democrats to discuss battle strategy. They say they see "eye-to-eye."

■ Views Asked on Renegotiation Act

Companies, particularly defense contractors, wanting changes in the U. S. Renegotiation Act have a chance to suggest them to Congress. The Joint Committee on Internal Revenue Taxation invites comments on the act, under which excess profits from government contracts are eliminated.

Suggested changes might be included in the committee's annual report to Congress. Suggestions should be written to Colin F. Stam, chief of the committee staff, Room 1011, New House Office Building, Washington 25, D. C.

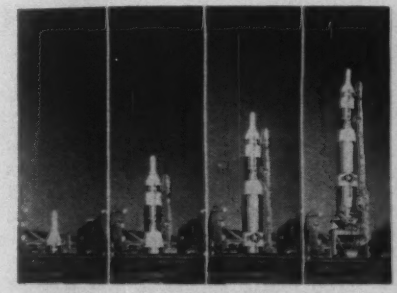
■ Russian Growth Held Threat to U. S.

The forecast that Russian growth will overtake U. S. growth is still with us. **The latest prediction: Unless the U. S. reverses the present trend, Russia could make the U. S. an inferior power by 1970.**

The forecast is made by Johns Hopkins Univ. researchers in a report for the U. S. Army. **The researchers also believe that the U. S. can reverse the trend without resorting to huge federal outlays.**

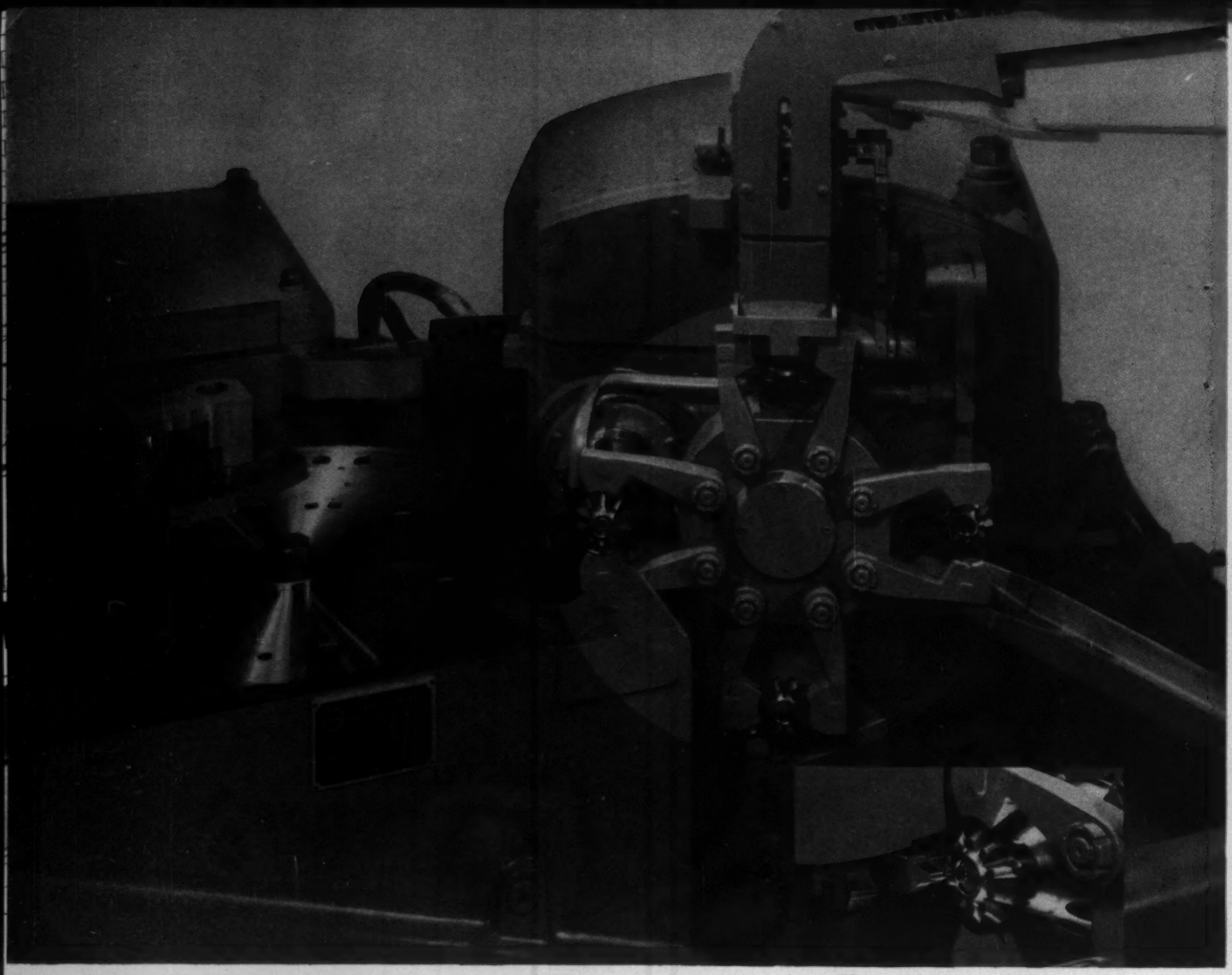
■ Money Available For More Missile Sites

More than $700 million remains on Defense Department books for basic concrete and steel missile site structures. Some of the money has not yet been put into contracts.



MISSILE BASES: Leftover money.

The U. S. Army Corps of Engineers, builders of Army and Air Force missile sites, is spending $30 million a month for site construction. So far $500 million worth of construction has been completed.



In Revacycle Method each blade of cutter is longer than its predecessor; there is no depthwise feed of cutter itself. One rotation of the cutter completes each tooth from the solid.

Fastest way yet to cut straight bevel gears

If you're looking for a faster, fully automatic way to cut straight bevel gears and pinions with conjugate surfaces and localized tooth bearings, consider the Gleason No. 109 Straight Bevel Revacycle® Machine.

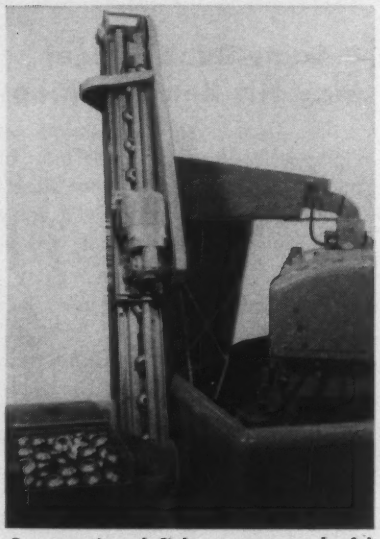
You rough, semifinish, and finish a gear from the solid blank with a single rotation of the Revacycle cutter.

Now both 21″ and 25″ diameter cutters can be used on the No. 109 Revacycle Machine. The 25″ cutter cuts gears to a maximum depth of 0.600″. The 21″ cutter will cut to a maximum of 0.400″.

A new, completely automatic mechanism loads and unloads each gear. You can feed this loader manually or with a conventional belt conveyer.

The No. 109 Machine handles a wide range of automotive and farm machinery gears: up to 10″ diameter, 5:1 ratio, 1¼″ face width.

Send for our bulletin for information on both the machine and the Revacycle Method.



Storage unit and flight conveyer can be fed manually or with belt conveyer. Even with manual operation, one operator can handle a battery of machines.

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

Exported Castroism Strong in Venezuela

The Communists and the pro-Castros in Venezuela finally forced President Romulo Betancourt to limit the rights of Venezuelan citizens. Now the unruly coalition will label the regime as a military dictatorship.

Had President Betancourt not taken action, the nation would have been torn apart by mobs, according to reliable intelligence received. This limitation on citizens, which covers assembly, communications, and travel within the country will hogtie some foreign plans for new projects—at least until it is known that the mobs are under control.

Evidence appears to exist that Castro underground rebels have been active in Venezuela with money furnished by the Soviets. This information comes from people who have left Cuba. It may take some time in Venezuela to clean up the "Fidelistas." Even then the Betancourt government will have to calm its people, many of whom have been hungry, unemployed, and ripe for a revolution.

Aluminum Makers Oppose Concessions

Aluminum, pig iron and steel scrap are among the 200 items this country is considering for tariff concessions in negotiations under The General Agreement on Tariffs and Trade (GATT). Aluminum producers have indicated they feel any changes should be in the direction of equalizing duties. As it stands, they say, this country taxes aluminum imports far less than most European nations. Our import rate of 4.5 pct compares with 35 pct for Switzerland and 20 pct for France. Among the major nations, only Great Britain is lower than the U. S.

U. S. Exports Up

U. S. exports in October bounced back 9 pct from the previous month to $1.76 billion. This is the highest monthly total since May and continues this year's rise of exports over 1959.

For the first ten months of 1959, exports totaled $13.5 billion. For this year, the 10-months total is about $16.229 billion.

Sheet & Tube Discloses Studies Abroad

A third American steel company has indicated interest in a European operation.

A. S. Glossbrenner, president, Youngstown Sheet & Tube Co., confirmed to The IRON AGE a report that his company is considering participation in an integrated steel mill in Belgium. Mr. Glossbrenner emphasized, however, that no definite steps had been taken.

"It's only a study," he said, "I have no idea whether it will go beyond the study stage. He revealed that French and Luxembourg interests are among those involved in the project.

In recent weeks, Allegheny Ludlum Steel Corp. and Crucible Steel Co. of America have disclosed plans to join in steel ventures abroad.

The Youngstown Sheet & Tube tentative plans are said to involve a new mill of about 1 million tons of capacity located somewhere on tidewater.

At the same time, construction of a new Armco Steel Corp. subsidiary plant in Chile is scheduled for completion within seven months. The new plant will produce alloy grinding balls for use in the Chilean copper mines.

The facilities stem from a new Chilean corporation formed by Armco International and Compania Electro Metalurgica S.A. of Santiago. The new affiliate has been named Armco Chile S.A.

"Molycop" balls will be the sole product of the new corporation.

VW Gains Inland

Volkswagen of America, via the St. Lawrence Seaway, delivered 30 pct more cars to Great Lakes ports than originally expected this year.

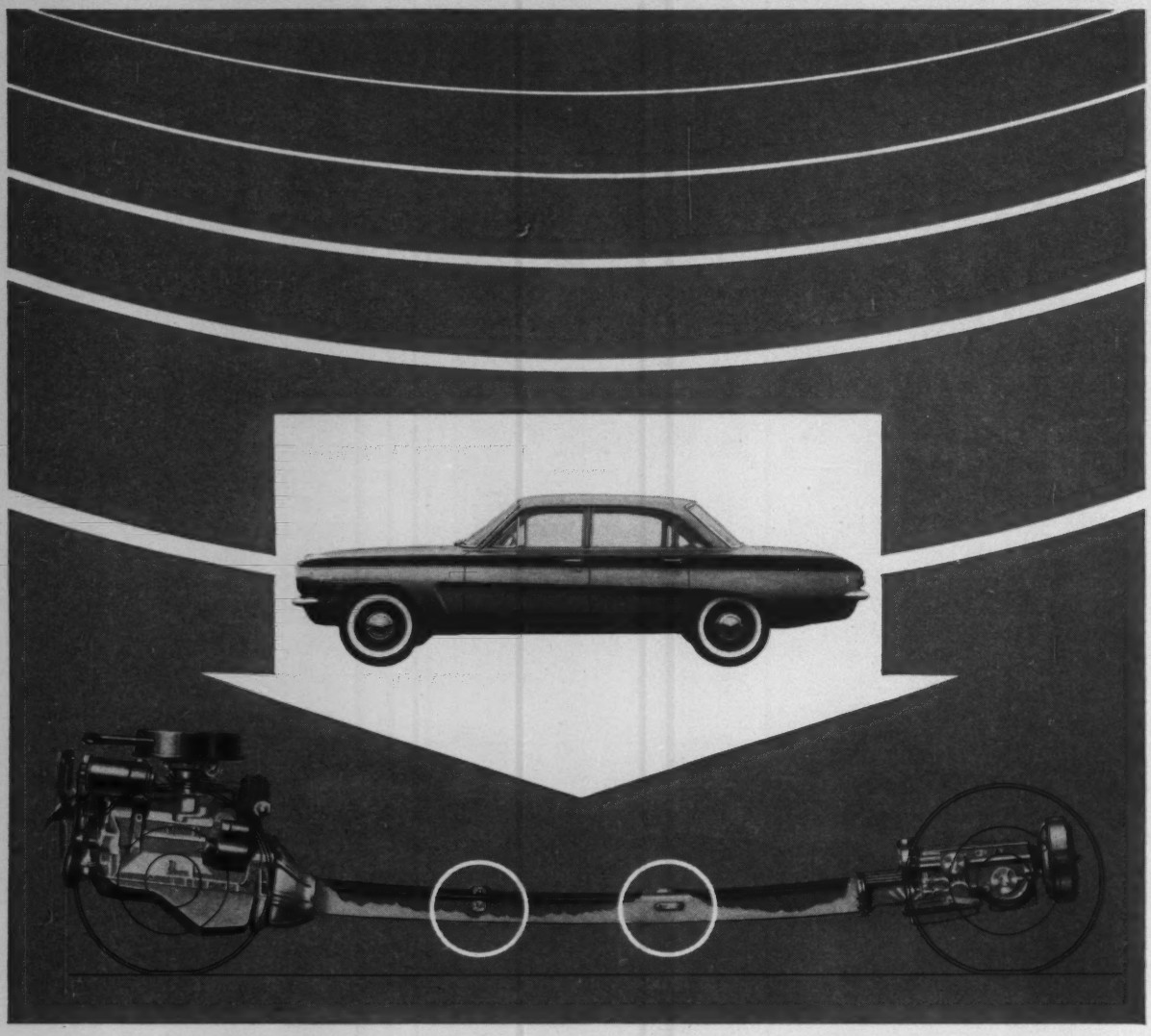
The German automakers originally hoped to deliver 16,000 Volkswagen sedans, trucks and station wagons to inland ports during the Seaway season. Late figures, however, show that the company actually put 21,495 vehicles on Toledo, Chicago, and Detroit docks.

Japan: Ideas Swapped

Several U. S. steel companies have technical agreements with Japanese steel firms. Projects cover training of Japanese steelworkers in this country, visits by American steel officials to the Japanese plants. Some of these projects are on a fee basis while others are more or less a liason which may turn into joint business endeavors later.

By and large, the idea is to swap techniques, train workers in this country, and in some cases send American technicians to Japan.

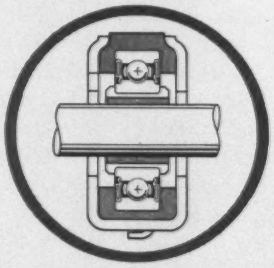
NEW DEPARTURE CASE HISTORY



NEW DEPARTURE BALL BEARINGS ARE USED IN TEMPEST'S REVOLUTIONARY NEW DRIVESHAFT!

N/D Sales Engineers cooperated with Pontiac engineers in the development of specially designed ball bearing assemblies to support the 2-inch "bend" in the Tempest driveshaft. These unique assemblies are rubber insulated to dampen driveshaft vibrations . . . and feature N/D sealed and lubricated-for-life Sentri-Seal ball bearings. Press-fitted with the bearings are plastic lined steel shells for snug support of this propeller shaft assembly—proved in over three million miles of rugged testing.

New Departure continues to help lead the way in advanced engineering for more reliable products in every line of industry and defense. For consultation or early design discussions on your ball bearing application, contact the N/D Sales Engineer nearest you, or call or write to New Departure, Division of General Motors Corporation, Bristol, Connecticut.



Two N/D ball bearing assemblies like this are mounted within "bent" torque tube.

NEW DEPARTURE

BALL BEARINGS · PROVED RELIABILITY YOU CAN BUILD AROUND

Improves Alloy Steels

First operation of a Dortmund-Horder-Huttenunion vacuum degassing unit in this country is taking place at the Crucible Steel Co. of America. Developed in Germany, the DHH unit uses a snorkel-tube device to draw hydrogen, oxygen and nitrogen from ladle steel. Crucible views the process as a "significant contribution to the steel industry." Benefits cited include reduced cooling time, increased yields and a reduction in the cost of alloying elements.

Reduce Slip-Plane Motion

Manganese added to cast aluminum-copper alloys increases both room and elevated-temperature properties. The additive forms an intermetallic compound, $Al_{12}Mn_2Cu$. This compound precipitates in the form of finely dispersed particles within grains of the alpha solid solution. In this stage there's very little tendency to coagulate. As a result, the movement of dislocations in slip planes and on grain boundaries is slowed down.

Prolongs Paint Life

An impervious and adherent oxide is formed by the atmosphere on nickel-copper high-strength low-alloy steels. This prolongs the life of paint applied to these steels. It also reduces the preparation costs that must precede repainting.

Flattens Abrasive Belts

Abrasive belts tend to curl at the edges when operated in low-humidity conditions such as those which prevail in winter. Dry steam in a low-cost humidifier prevents this edge cupping or curling. Advantages include longer belt life, higher grinding pressures and improved finishes.

Eliminate Color Matching

To insure uniform quality in anodized-aluminum parts, a major automaker has devised a new electro-chemical test. This test is rapid, relatively inexpensive and it requires little space or equipment. By providing consistent standards, the test overcomes the uncertainty that sometimes crops up with use of anodized colors.

Metal-to-Metal Surfacing

A new metal-to-metal surfacing process permits powdered metals to be sprayed or fused on base metals by means of an oxyacetylene flame. This process deposits easily-prepared powdered metals with high melting points on base metals with lower melting points. It serves on such parts as pistons, valves, saw-blade guides and other sliding surfaces on engines and pumps.

Pressure Forges Tubing

Compression-forged welded tubing boasts higher physical properties than seamless tubing of equal alloy grade. After welding, the tubing is drawn under tension through tapered dies. These dies rock back and forth to compress and cold work the metal over a mandrel. Inner and outer diameters and wall thickness are all reduced as the length of the tubes is increased.

Reconsider Basic Brick

Basic brick is moving back into the picture. A new electric furnace, still in the test phase, uses basic-brick inserts in a conventional roof. Early results promise longer life from these internal- and external-plated, openhearth, basic-roof bricks. Tests aren't complete, but they already indicate greater strength with the basic-brick construction.

Better Fasteners?

Glue may replace "a stitch in time." An adhesive expert foresees a future of clothing without stitches, houses without nails and airplanes without rivets. He predicts that strong, new adhesives will be substituted for the fasteners now in common use. Already, the performance of helicopter blades, safety glass, auto brake shoes and nonmagnetic mine sweepers hinges on the adhesives with which they are assembled.

Shop Superintendent—Kennametal Carbide Engineer—Machine Operator

3-man team solves operating problem

...standardized on one insert for all tools —increased production—reduced downtime

PROBLEM: Original carbide insert (not Kennametal), used in machining a wide range of alloy steels on Gray double-cut planer, had complicated shape; could be used only in special head; different inserts were required for other heads. Thin cross section resulted in costly downtime due to breakage.

SOLUTION: Simplified change in tool geometry, recommended by 3-man team, permitted use of Standard Kennametal* carbide insert.

RESULT: Required only one type of Kennametal insert for all tools. Reduced downtime through increased thickness of insert. Provided easier indexing and greater depth of cut. Insert cost for new setup is 60% less than previous insert cost.

That's the kind of product and service that you can get through your Kennametal carbide engineer.

Thoroughly trained in carbide products, he devotes his time exclusively to the sale and application of Kennametal hard carbides . . . and is well qualified to provide on-the-spot analysis and recommendations. If your job requires unusual or special design, engineering and application service, your Kennametal man will make our headquarters engineering and manufacturing facilities available.

Depth of on-the-job experience —plus the continuing development of a variety of tungsten, titanium, and tantalum carbide grades—has lead to the use of Kennametal compositions in practically every industry. And our product development group, by working in close cooperation with design engineers, sales engineers and customers, keeps coming up with new products and new applications—engineered and developed to meet both general and specific customer requirements.

We believe you will be interested in our booklet, "There's Profit in Retiring a Tradition," which gives facts on how some companies have reduced machining costs as much as 70 per cent. Based on actual cases, it makes practical and profitable reading. Ask your Kennametal Carbide Engineer for a copy . . . or write direct to KENNAMETAL INC., Dept. IA, Latrobe, Pa.

*Trademark 33552

INDUSTRY AND KENNAMETAL ...Partners in Progress

LETTERS FROM READERS

Be Counted

Sir—Hooray! At last someone speaks out for the manager who manages; in other words, does the job he is paid to do. Your recent article, "Wanted: Managers to Manage," (IA, Nov. 3, p. 55) was like a beacon of light in a dark world. I hope it becomes an inspiration and a guiding light.

To express my feelings on this subject in order of mention in your article, I will start with your statement, "Many companies . . . don't like it when a manager points to a group decision when there is a blunder." Who can blame them?

In the first place, if a man is a man, he will stand up and be counted, right or wrong.

When we managers make a decision, it is ours. It does not belong to the lieutenant to whom we delegate the task of gathering the facts or making the original report. He works for the manager. If the manager uses the report and promulgates it to the world, it belongs to the manager. He again raises a point that separates the manager from the pensioner. If the decision is correct and was based on ideas presented by the junior, the good manager will let everyone know it was the junior's idea and praise him to others as well as to himself. If the decision or report was fallacious, the real manager accepts full responsibility. Most executives realize this is the true place of responsibility anyway.

It was the manager who broadcast the decision. He was not forced to rely on anyone else's judgement. Naturally, we have to delegate responsibility and make those who work for us grow as much as possible. But this is not a cloak to hide behind. It is, rather, another test of our ability in a different field—the selection and training of competent help.

Also, a competent manager will not hide behind the group decision of a committee. In fact, it is my feeling that a top man will shun committees and prefer to make his own decisions. A real man prefers to think a problem through, then make his own decision.

Naturally, there are times when we have to work with others. No man is an island. Fine, let us work with others, but let's not use this "togetherness" as a crutch.—Homer F. Bennett, E. B. Wiggins Oil Tool Co., Inc., Los Angeles, Calif.

Dow's Side

Sir—My attention was directed to several paragraphs on magnesium diecasting in the Nov. 10 issue of The IRON AGE ("Diecasters Plan 1961 Spending," p. 135). Actually the report there doesn't quite mesh with Dow Chemical Co.'s sales of its magnesium diecasting alloy, AZ91B.

Our sales of AZ91B in 1959 were 164 pct of what they were in 1958, and so far this year they are 190 pct of what they were in 1959. Thus, sales this year are more than 300 pct of what they were in 1958. And this is despite a general slowdown in metal sales, including magnesium for most purposes other than diecasting.

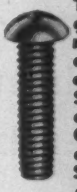
The price of magnesium has not been raised since August, 1956, while most other metal prices have been increased. Our diecasting alloy is now sold on a basis that makes it very competitive with other popular diecasting metals, alumimum and zinc.—William B. Seward, Dow Chemical Co., Midland, Mich.

A Clear Statement

Sir—Your editorial in the Nov. 10 issue of The IRON AGE ("Business Trends: A Return to Normalcy") put into words many of the conclusions that we have arrived at within the last year. Congratulations to you on the clear statement that you have made on problems confronting American industry at this time.—George P. Hough, vice president, A. O. Smith Corp., Chicago, Ill.

WIRE FOR SUDDEN SERVICE

ON SOUTHERN FASTENERS



The wire you see in this photograph will make a multitude of machine screws. This is only a very small portion of the enormous stock carried in Southern Screw's modern six-acre plant in Statesville, North Carolina. All this stock and all this space means that Southern's manpower, machines and materials are ready to give "sudden service" to your order regardless of its size.

Southern specializes in USA-made fasteners—makes nothing else. This is your guarantee that your fastener problems are Southern's only interest.

If you want sudden service on quality fasteners, plated or plain, Phillips or slotted, standards or specials, get in touch with the Southern Screw distributor, or wire, phone or write to Southern Screw Company, Telephone: TRiangle 3-7213, Statesville, N. C.

WAREHOUSES:
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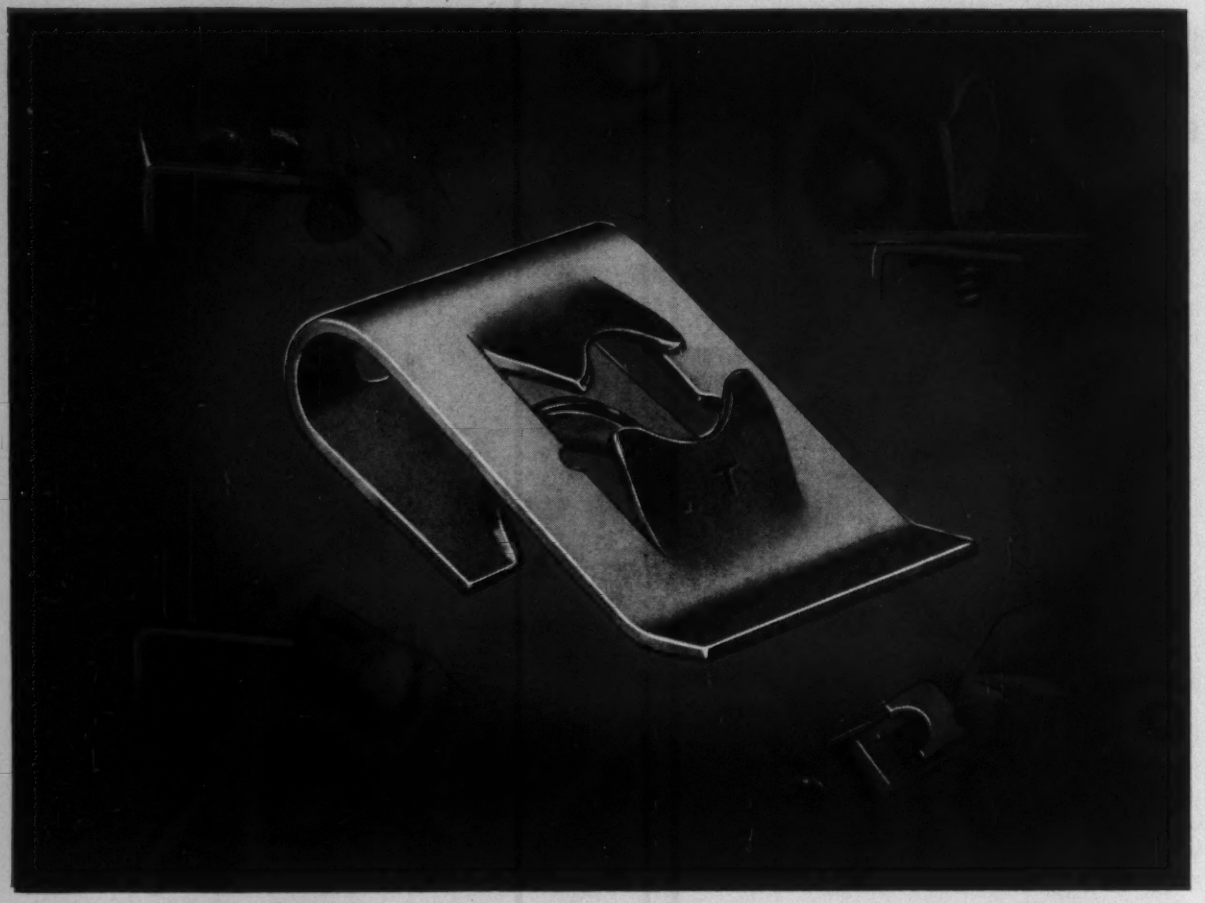
Machine Screws & Nuts • Tapping Screws • Stove Bolts • Wood Screws • Carriage Bolts • Continuous Threaded Studs • Drive Screws • Dowel Screws • Hanger Bolts



Another Tinnerman Original...

Self-retaining "U" and "J" SPEED NUTS® cut assembly costs up to 50% or more!

If you are worried about rising assembly costs, let one-piece "U" and "J" SPEED NUTS keep costs down... and improve your product.

They can't fall off, once they've been pressed into screw-receiving position. No welding, staking or other secondary fastening devices needed. You eliminate lock washers – spring steel SPEED NUTS are self-locking, make vibration-proof attachments.

SPEED NUTS are ideal for blind assembly or hard-to-reach locations. Apply them *before* you paint panels without danger of paint-clogging. Or *after* porcelainizing, without damage to finishes. The "U" type is similar to the "J" type, shown above, but is used where full bearing surface on the lower leg is required.

A free Fastening Analysis can tell where SPEED NUT brand fasteners belong on your products. Call your Tinnerman representative –he's listed in most major telephone directories. Or write to:

TINNERMAN PRODUCTS, INC.
Dept. 12 • P.O. Box 6688 • Cleveland 1, Ohio

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Speed Nuts®

FASTEST THING IN FASTENINGS®

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FATIGUE CRACKS

Full Exposure

At a National Press Club luncheon to discuss the report of the President's Commission on National Goals, commission chairman Henry M. Wriston commented that never before in his long life had he been "photographed so much for photos that were used so little."

Just at that moment, a commission staff member handed Dr. Wriston a "hot off the presses" copy of the Dec. 1 IRON AGE.

The First Time — His picture, with commission vice - chairman Frank Pace, was on the cover. It

Frank Pace and Dr. Wriston

brought a smile from Dr. Wriston and the comment that it was the first cover picture to hit the magazines.

Pardon us if we bow a little. But, the fact is, that no other business magazine—and very few national magazines—analyzed the commission's very important report this early, much less getting picture coverage, too. This was due to advance planning. The IRON AGE began work on the report on America's goals for the future long before the report was made.

Thorough Coverage—Mr. Pace told an audience of Washington correspondents at the Press Club that he hopes the report will not be a temporary phenonenon which would disappear from the scene after hitting the front pages for one day.

It won't, as far as The IRON AGE is concerned. The reason it won't is that we feel thorough coverage of national issues of vital importance is a prime function of business magazines.

This week, and for the next three weeks, you'll find IRON AGE Managing Editor E. C. Beaudet's analysis of the commission's goals as they affect business: Economic growth and organization see p. 89; technological change; foreign trade policy; and growth in the decades ahead.

New Machining Methods

Metalworking changes are piling up at a bewildering rate. Many of today's products contain materials that were only names in textbooks a few years ago. Tomorrow promises more changes.

Fill the Gap—To help you keep pace with the ever-changing metalworking picture, our editors have chosen special machining methods for this week's portion of the award-winning series: "How to Get More for Your Metalworking Dollar," (p. 109).

What is a special machining method? How does it fit into your production picture? Can these special methods replace conventional chip-removal processes? And how do these new methods form complex shapes from materials that designers previously rejected as unmachinable?

Conventional machining hinges on a tool in motion on a workpiece. Such shear-plane cutting has limitations. Since the tool operates in two planes, a series of cuts must be made to obtain the third dimension.

Three-D Work—Without making chips, most special machining methods operate in three dimensions at the same time. These specials include: Mechanical abrasion or ultrasonics; electrical discharges or electro-chemical effects; heat with a variety of torches; and chemicals for etching or eroding.

Milford's Models 56 and 57 offer unlimited flexibility in automatic assembly!

Group these new "Building Blocks" to suit your production needs. Use them singly, in pairs, in threes, fours or even fives. Write for more information on multiple riveting, the newest answer to reducing assembly costs.

For more new ideas, tips and technical data on tubular rivets and rivet-setting machines, ask your Milford Representative for a look at Milford's new MANUAL OF MODERN RIVETING PRACTICE.

THE MILFORD RIVET & MACHINE CO.

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ELYRIA, OHIO • AURORA, ILL. • NORWALK, CALIF.

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...

Profitability? Faced with the decision to expand your plant facilities, you should first determine whether all elements combine to form a pattern of future profitability. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. The studies and evaluations furnished by KE Pre-Engineering represent only one phase of total KE services. Kaiser Engineers designs and builds for the Steel industry...offers skilled experience in all types of facilities from raw material plants to finishing mills. From Pre-Engineering through design and construction, Kaiser Engineers provides complete one-company service and ingenuity based on years of experience.

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COMING EXHIBITS

International Heating & Air-Conditioning Show—Feb. 13-16, International Amphitheatre, Chicago. (International Exposition Co., 480 Lexington Ave., New York 17.)

MHI Pacific Coast Show—Feb. 22-24, Cow Palace, San Francisco. (Material Handling Institute, Inc., One Gateway Center, Pittsburgh 22.)

Western Metal Show—March 20-24, Pan Pacific Auditorium, Los Angeles. (American Society for Metals, Metals Park, Novelty, O.)

Plant Maintenance & Engineering Show—Jan. 23-26, International Amphitheatre, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

MEETINGS

JANUARY

The Institute of Scrap Iron & Steel, Inc.—Annual convention, Jan. 8-11, Hotels Fontainebleau and Eden Roc, Miami Beach, Fla. Institute headquarters, 1729 H St., N. W., Washington 6, D. C.

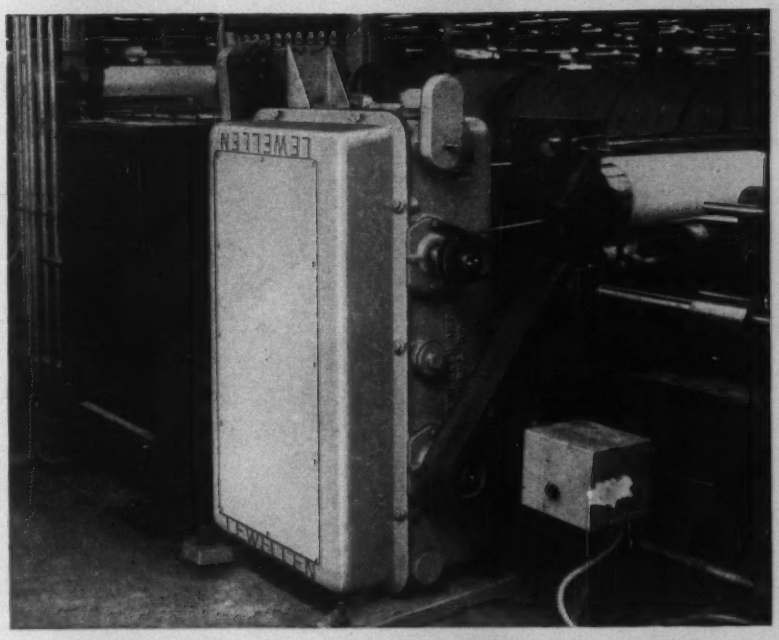
Aluminum Window Mfrs. Assn.—Annual meeting, Jan. 9-12, Emerald Beach Hotel, Nassau, Bahamas, Association headquarters, 630 Third Ave., New York.

Society of Automotive Engineers, Inc.—Annual meeting, Jan. 9-13, Cabo Hall and Convention Arena, Detroit. Society headquarters, 485 Lexington Ave., New York, N. Y.

Hoist Manufacturers Assn., Inc.—Annual meeting, Jan. 10, Statler Hotel, Cleveland, Association headquarters, One Thomas Circle, Washington.

Steel Shipping Container Institute, Inc.—Winter meeting, Jan. 17-18, St. Regis Hotel, New York. Institute headquarters, 600 Fifth Ave., New York.

Steel Plate Fabricators Assn.—Annual meeting, Jan. 18-20, Logo



MATCH the SPEED to the OPERATION...AUTOMATICALLY

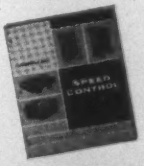
LEWELLEN
V/S TRANSMISSIONS

Machine motions, which reflect the operation, may be coupled with Lewellen Controllers to provide precisely the speeds the operation demands. For example—

This Champlain Laminator and Four-Color Press installation at the Alton Boxmakers mill.

Lewellen V/S Transmission drives Laminator at speeds that synchronize with Press, at constant web tension. Lewellen Controller couples to floating roll between machines.

Measuring ratios of machine motions will obtain proportionate speeds—or—measuring rates of motions will maintain these rates, whatever the speeds required.



Lewellen V/S Transmissions and Controllers provide stable, continuous operation automatically, by translating machine motions into correct speeds, at the right moment.

WRITE FOR CATALOG 65

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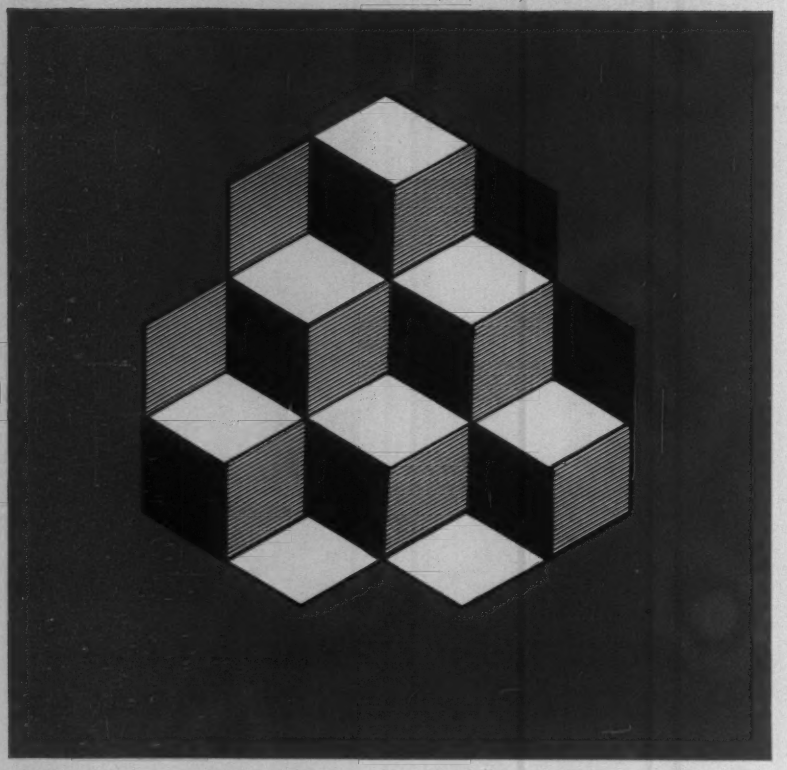


TAKE A SECOND LOOK!

Are you getting FULL Value for your Abrasive Dollar?

Count the cubes in the figure. You'll see six or seven, depending upon your point of view. Consider the total value of your present abrasive, and compare it with the proven value of Wheelabrator Steel Shot. Not just in price, but in abrasive consumption, cleaning speed, cleaning quality, and equipment maintenance costs as well. From any point of view, the proven quality of Wheelabrator Steel Shot adds up to extra value and extra profit.

Write today for this new handbook of blast cleaning abrasive performance. It's full of charts and facts you can use to help cut abrasive consumption, reduce cleaning costs. Write to Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 409, Scarborough, Ont.

WHEELABRATOR
STEEL ABRASIVES

MEETINGS

Mar Hotel, Fort Lauderdale, Fla. Association headquarters, 105 W. Madison St., Chicago.

Industrial Heating Equipment Assn., Inc.—Annual winter meeting, Jan. 23-24, Dearborn, Mich. Association headquarters, 2000 K St., N. W., Washington, D. C.

Instrument Society of America—Annual meeting, Jan. 23-25, Hotel Astor, New York. Society headquarters, 313—6th Ave., Pittsburgh.

Society of Plastic Engineers, Inc.—Annual technical meeting, Jan. 24-27, Shoreham & Park Sheraton, Washington, D. C. Society headquarters, 65 Prospect St., Stamford, Conn.

National Tool & Die Manufacturers Assn.—Winter board meeting, Jan. 24-28, Biltmore Hotel, Palm Beach, Fla. Association headquarters, 907 Public Square Bldg., Cleveland.

Metal Lath Manufacturers Assn.—Meeting, Jan. 25-26, Pick-Carter Hotel, Cleveland. Association headquarters, Engineers Bldg., Cleveland.

Cutting Tool Manufacturers Assn.—Annual business meeting, Jan. 26, Harmonie Club, Detroit. Association headquarters, 1216 Penobscot Bldg., Detroit.

National Assn. of Secondary Material Industries, Inc.—Midwestern Div. regional meeting, Jan. 26, Statler-Hilton Hotel, Detroit. Association headquarters, 271 Madison Ave., New York.

Truck-Trailer Manufacturers Assn., Inc.—Annual convention, Jan. 29-Feb. 1, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters, 710 Albee Bldg., Washington, D. C.

Steel Kitchen Cabinet Manufacturers Assn.—Midyear meeting, Jan. 31, Sheraton Towers Hotel, Chicago. Association headquarters, 910 Park Bldg., Cleveland.

For some pointers on steel plate savings...

This illustrated 16-page booklet outlines the Steel Plate Shapes Service available from Lukens Steel Company; describes scores of typical shapes produced on Lukens facilities; points out the cost-cutting features of this "pre"-fabricating service: *savings* on steel freight costs, scrap handling expense, shop spoilage, capital investment. For your free copy, simply fill in and mail this coupon.

LUKENS STEEL COMPANY
Fabrication Building, Dept. A-120
Coatesville, Pa.

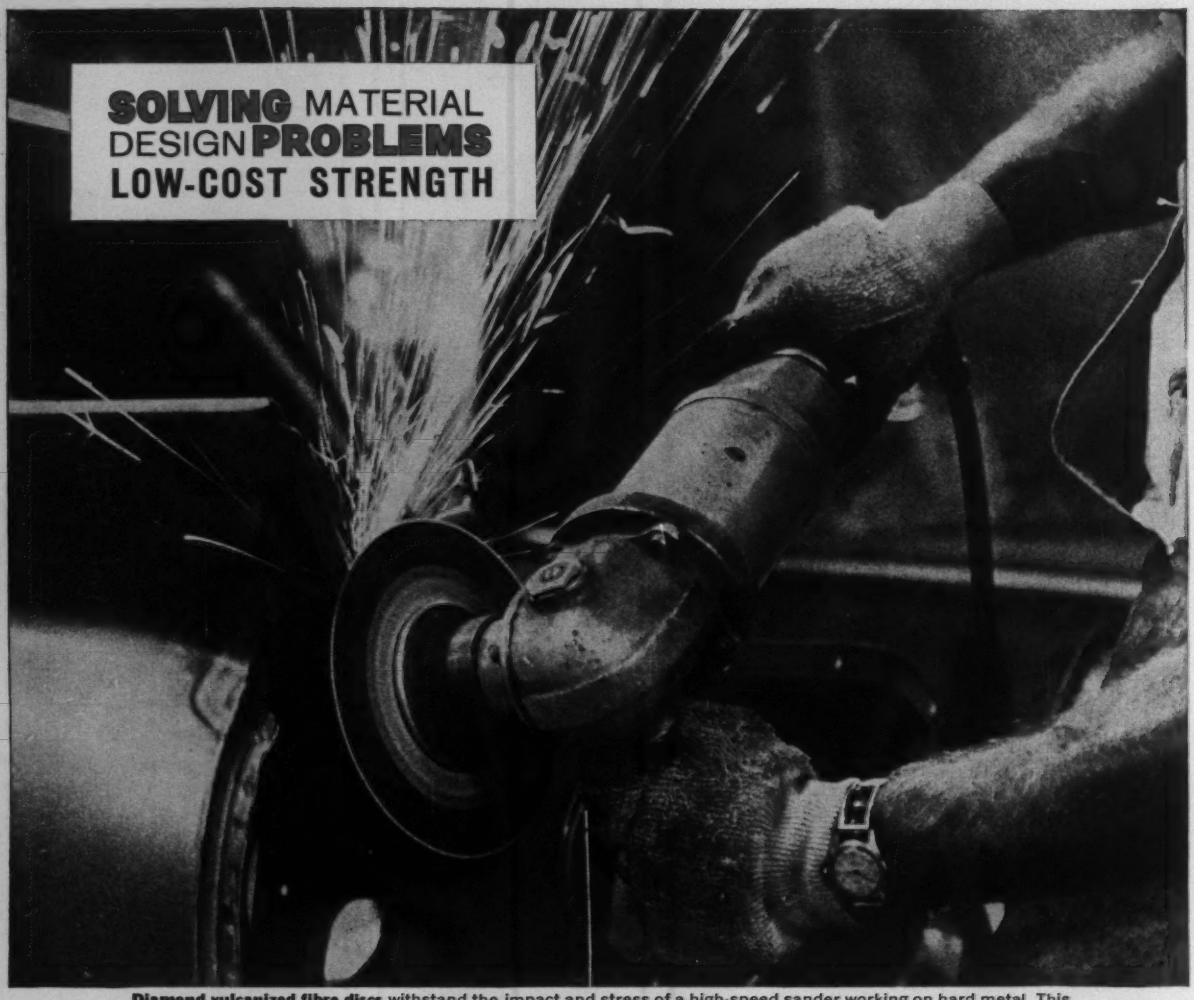
Please send me your free booklet on Steel Plate Shapes.

NAME _____

COMPANY _____ TITLE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

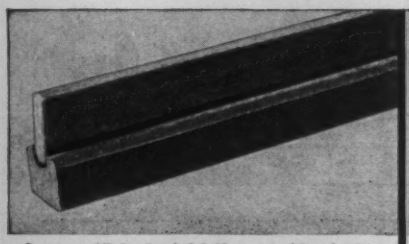


Diamond vulcanized fibre discs withstand the impact and stress of a high-speed sander working on hard metal. This tough and flexible material combines long life with very low cost in some of the most difficult jobs in industry.

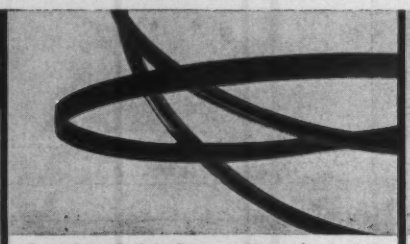
Tough, light-weight and low cost, Diamond® vulcanized fibre is an electrical insulator that combines excellent mechanical properties with easy fabrication in low cost tools. It is available in standing forms or in parts manufactured to your specifications. Whatever other properties you're looking for — heat resistance, long wear, machinability or compressive strength — you can easily find in the industry's most complete line — CDF laminated plastics, vulcanized fibre and flexible insulating materials. Check our specs in Sweet's PD file or write on your letterhead for General Folder 60.

CONTINENTAL-DIAMOND FIBRE

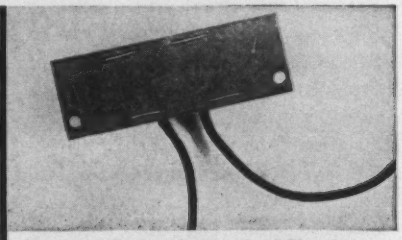
A SUBSIDIARY OF THE Budd COMPANY • NEWARK 85, DEL.
In Canada, 46 Hollinger Road, Toronto 16, Ont.



Low coefficient of friction combined with low cost make Diamond vulcanized fibre ideal for such uses as tracks for sliding glass doors and windows.



Superior electrical properties. A reason why CDF's Diamond vulcanized fibre is widely used for slot liners in small electric motors and transformers.



Low cost. Diamond vulcanized fibre helps keep electrical appliance costs low. This food mixer insulator is an example.

WESTINGHOUSE PRODAC BOSSES NEW 53" BLOOMING MILL

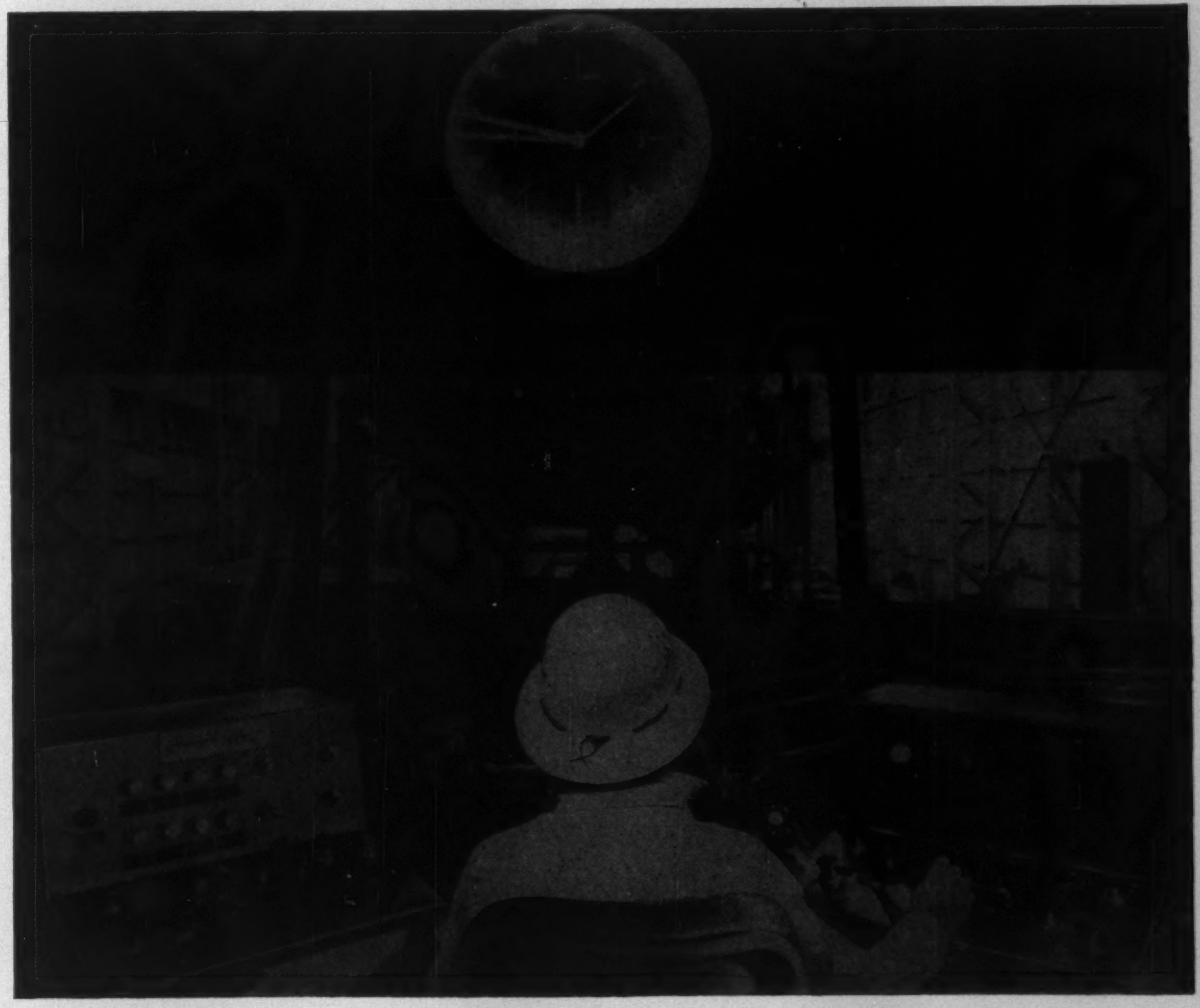
Punched cards whip through a reader . . . and the new 53" blooming and slabbing mill at U.S. Steel's South Works automatically squeezes 20-ton white-hot ingots into blooms. Bossing the complete operation: Westinghouse PRODAC* control, the first fully automatic control applied to a blooming and slabbing mill.

PRODAC control is one way U.S. Steel is tackling the challenge of increasing productivity. PRODAC slashes time delays between passes, utilizes full mill capacity, and eliminates human error to assure consistent, efficient operation.

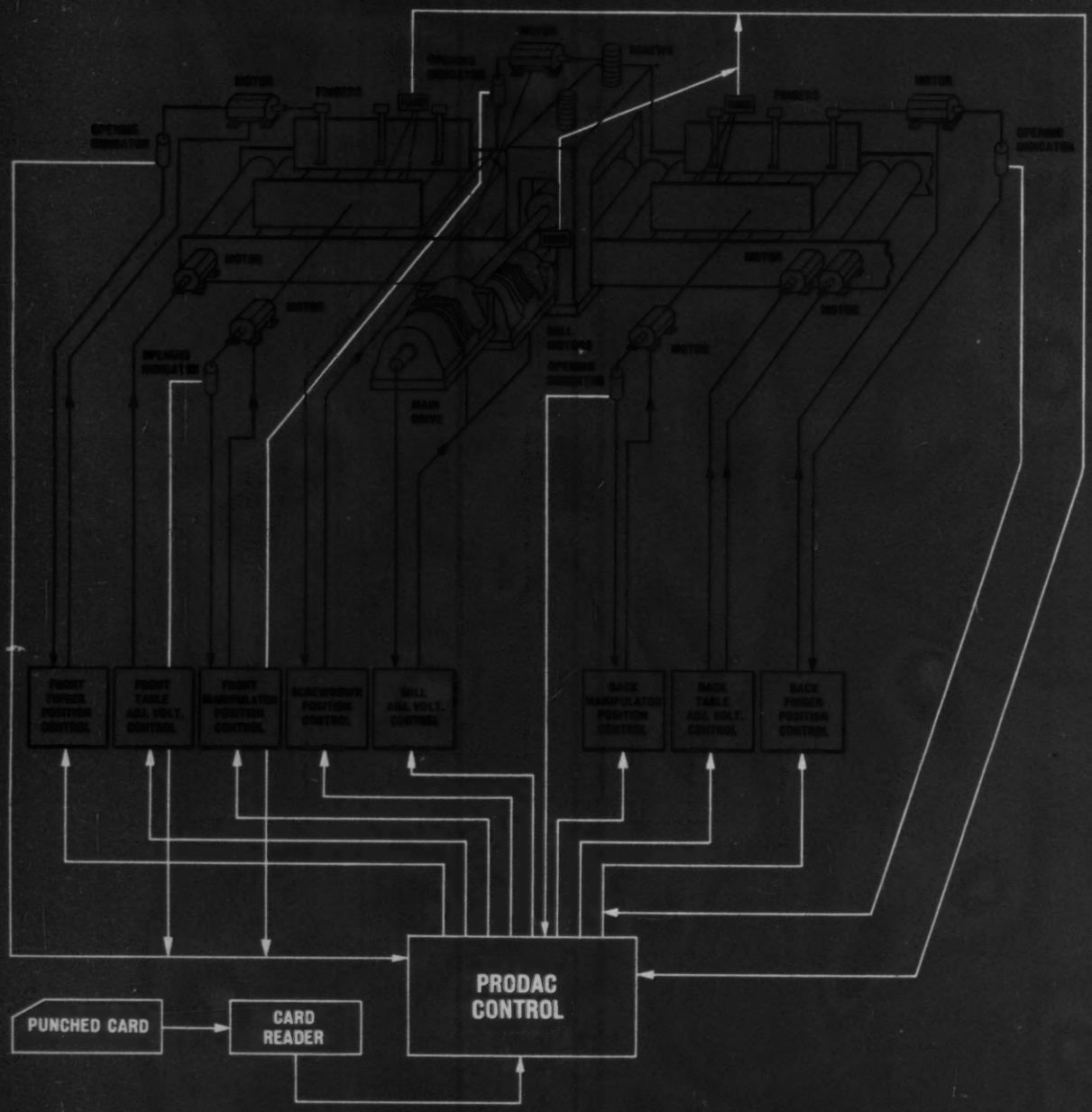
Turn the page and you'll learn exactly how PRODAC goes about bossing the mill. *Trade-Mark J-96155

STRADDLING THE MILL TABLES is pulpit from which operator monitors mill performance. Compact desks containing unique, miniaturized controls may be operated manually if necessary. Card reader is accessible to operator for new schedules.

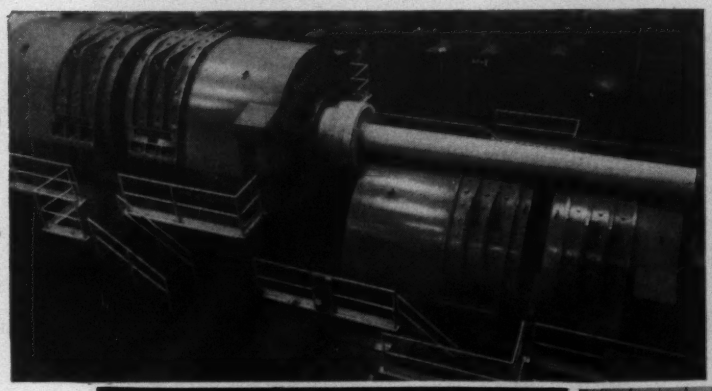
Westinghouse



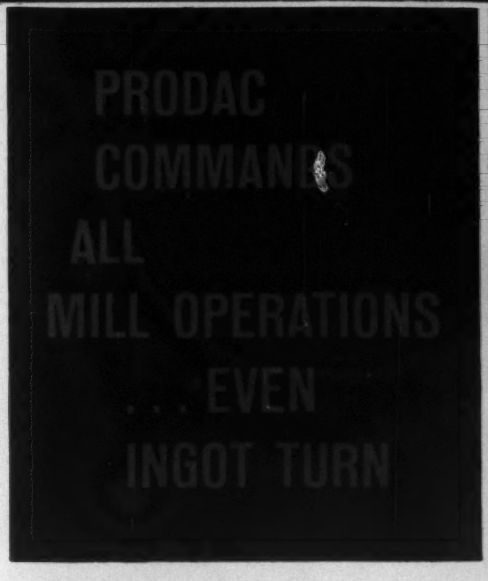
53" BLOOMING AND SLABBING MILL

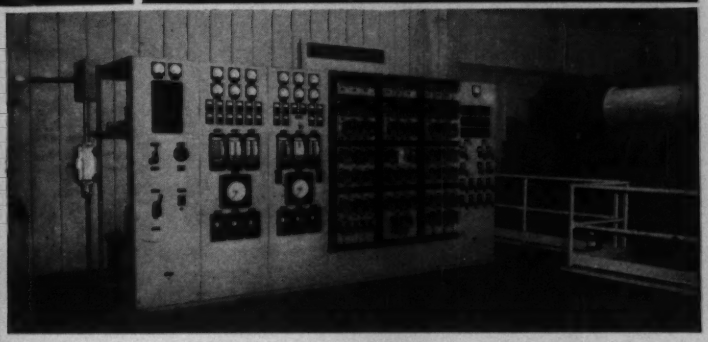


MILL MUSCLES are dependable Westinghouse motors. Here is the 12,000-hp, 40/80-rpm twin drive (foreground) with 10,000-kw flywheel m-g set.



MILL BRAIN is PRODAC control system, housed in compact cabinet, which automatically operates mill by duplicating manual actions on a predetermined sequence.





THE MAIN DRIVE CONTROL features rugged steel panel construction.

PRODAC directs U.S. Steel's new blooming and slabbing mill from only three punched cards. They contain all operating information needed to execute a rolling schedule of as many as 29 passes. As shown on the diagram opposite, the cards are fed into a card reader by the operator and the data is stored in PRODAC's memory. The operator hits a button . . . PRODAC takes over.

FOR EACH PASS, PRODAC uses the proper stored data to send signals to appropriate control elements. Main drive entry speeds, acceleration and deceleration rates are precisely regulated. Screwdown openings are positioned to a final accuracy band of $\pm\frac{1}{32}''$ over a 60″ opening range, while sideguards are positioned to $\pm\frac{1}{2}''$ accuracy band over a 120″ range.

At PRODAC's direction, manipulator fingers turn the ingot by lifting to any of seven heights. Mill feed rolls and tables match their speed to the main drive and, on direction, adjust themselves to a present draft compensation. PRODAC control also provides for tandem rolling during early passes.

WHEN A PASS IS COMPLETED, hot metal detectors report the ingot ready for the next pass, and PRODAC sets up the mill. One schedule can be repeated for successive ingots or, for a different schedule, the operator inserts new cards and lets PRODAC carry on.

J-96155-3

Westinghouse

WHEN PRODAC SIGNALS, WESTINGHOUSE MILL DRIVES RESPOND INSTANTLY

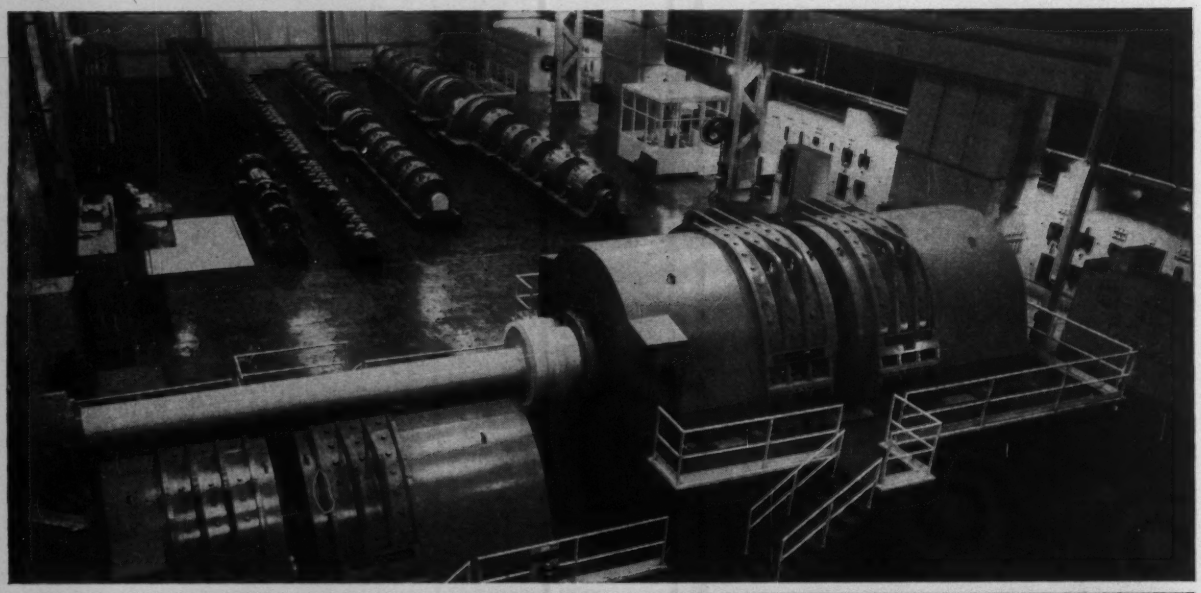
The Westinghouse drive system and related power equipment share the spotlight with PRODAC in the successful automation of U.S. Steel's blooming and slabbing mill.

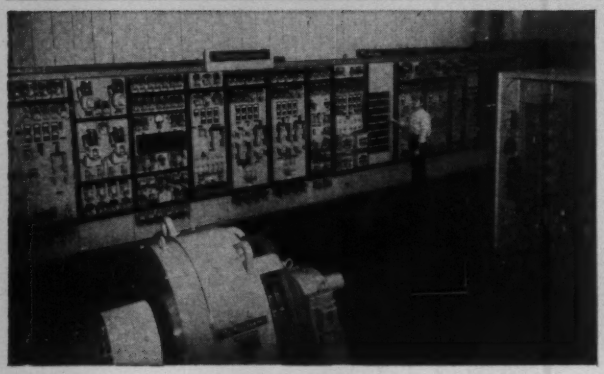
The 12,000-hp main mill drive consists of two 6000-hp double armature twin motors. The screwdown, manipulators, fingers, and front and back table and feed rolls each have Westinghouse adjustable voltage drives complete with Magamp regulators. Complete engineering and coordination of these drives assure the instantaneous response to PRODAC's commands critical to keeping the mill on schedule.

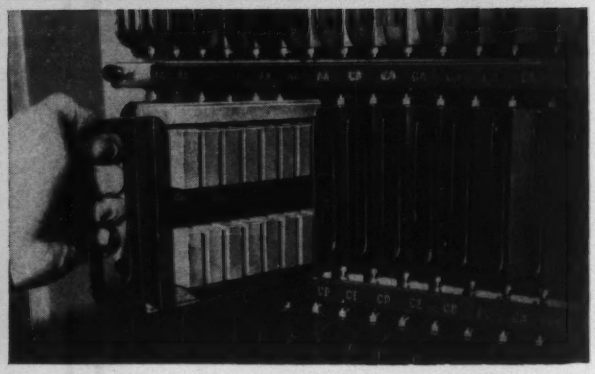
PRODAC control like that for U.S. Steel is a key element in Westinghouse *Progressive Automation*. This new concept aims at helping steel producers boost product quality and quantity through economical, step-by-step automation. Your Westinghouse representative has details on *Progressive Automation* . . . and PRODAC. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. *You can be sure . . . if it's Westinghouse.* J-96155-1-4

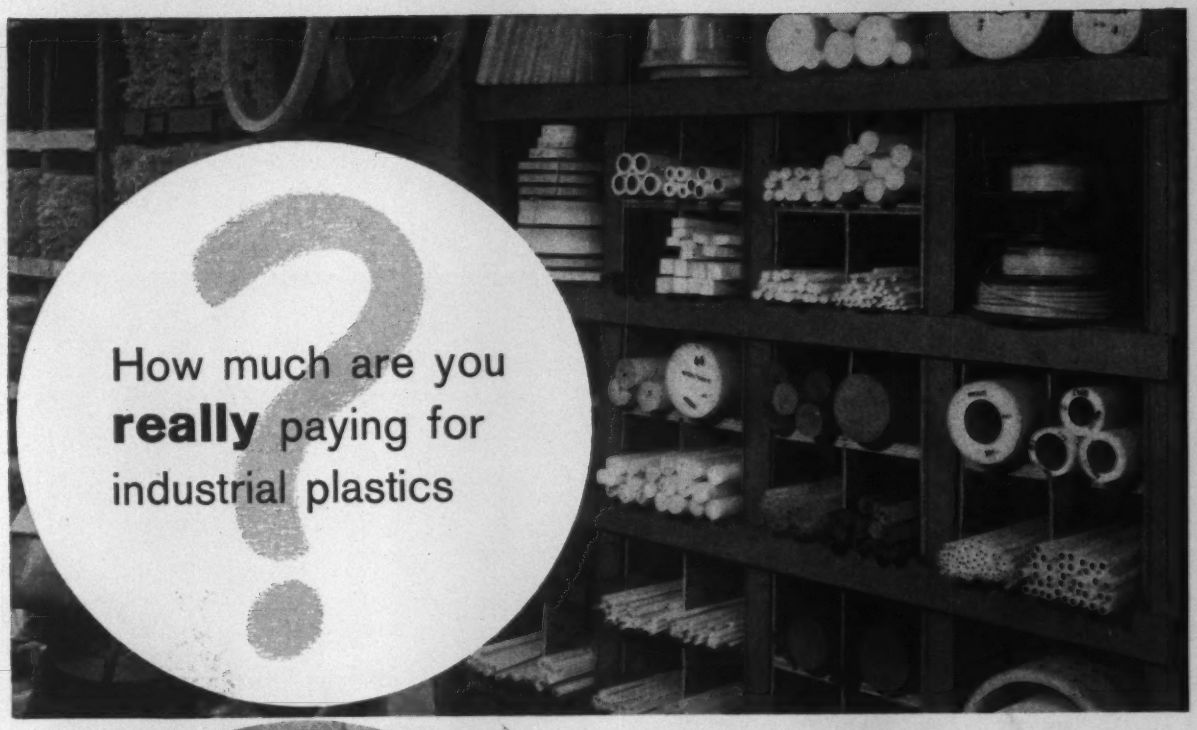
Westinghouse

12,000-HP MAIN MILL DRIVE (foreground) with auxiliary m-g sets and exciters (upper). **THE FIRST ALL-STEEL PANEL** construction is utilized in this variable voltage auxiliary control (lower left). **SINCE THE INSTALLATION** of the mill, the PRODAC module, representing a circuit function, has been refined. The new module is shown below and is easily accessible for removal or replacement (lower right).









When a critical nylon bearing fails or a TFE insulator fails in service, the responsibility could be yours . . . if you specified the original stock shapes.

In many cases, internal voids and flaws in nylon and other plastic shapes don't show up until it's too late . . . until end-products fail or after expensive rejects start piling up. And how do you put a price tag on these losses in time, material, customer good will and your own reputation?

You can prevent such losses by buying only plastics of known internal quality and uniformity. And you get them from Polymer.

Ultrasonic testing, a new exclusive Polymer quality control, guarantees you this uniformity. It quickly detects internal flaws which ordinarily would pass even the closest inspection.

That's why, when you specify POLYPENCO you can be sure you get plastics with constant electrical and physical properties so necessary for end-product reliability and efficient waste-saving production. Remember this next time you compare industrial plastic "prices". Quality makes the important difference.

Unmatched POLYPENCO quality and engineering services are available coast to coast. Call or write today for fast delivery or help when you need it.

- . . . Nylon—rod, tubing, tubular bar, strip, plate, disc
- . . . TEFLON† TFE—rod, tubing, spaghetti tubing, tape, sheet, thin wall tubing
- . . . FLUOROSINT® TFE fluorocarbon mill shapes and molded parts
- . . . NYLAFLOW® Flexible Nylon Pressure Tubing and hose
- . . . Q-200.5 Cross-Linked Polystyrene—rod and plate
- . . . K-51 Chlorinated Polyether—rod, tubular bar, strip
- . . . Polycarbonate resin—rod, plate, disc, tubing
- . . . NYLATRON® GS Nylon Molding Powders
- . . . NYLASINT® Finely Divided Nylon cold pressed and sintered parts
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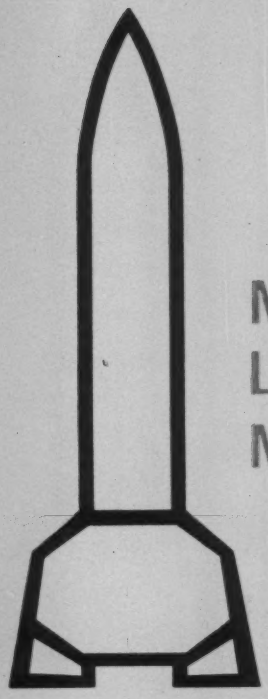


MISSILE LAUNCHER MADE MOBILE-LIGHT, TAKEOFF-TOUGH WITH

N-A-XTRA

HIGH-STRENGTH STEEL

A battlefield might be anywhere. Wherever it is, there may be a need for the new 10,000-pound, 36-foot Sperry-Rand U.S. Army Sergeant missile. That's why the launching station on which the missile is assembled, aimed and fired must be light enough to be transported by land, sea or air. Yet it also has to be rugged and strong enough to assure the launcher's availability for subsequent firing.

N-A-XTRA steels meet all the conditions of light weight, high strength and impact resistance. Pound for pound, they're nearly three times stronger than mild carbon steel. They are used, not only in this mobile missile launcher, but in many other defense products and in commercial equipment such as earth-moving vehicles, heavy machinery and pressure vessels.

Fabrication qualities are an N-A-XTRA bonus. Even at extreme subnormal temperatures, they remain tough and readily weldable. Conventional methods—cold forming, gas cutting, shearing and machining—give superior results, too. For further information, write Product Development Department, Great Lakes Steel Corporation, Detroit 29, Michigan.

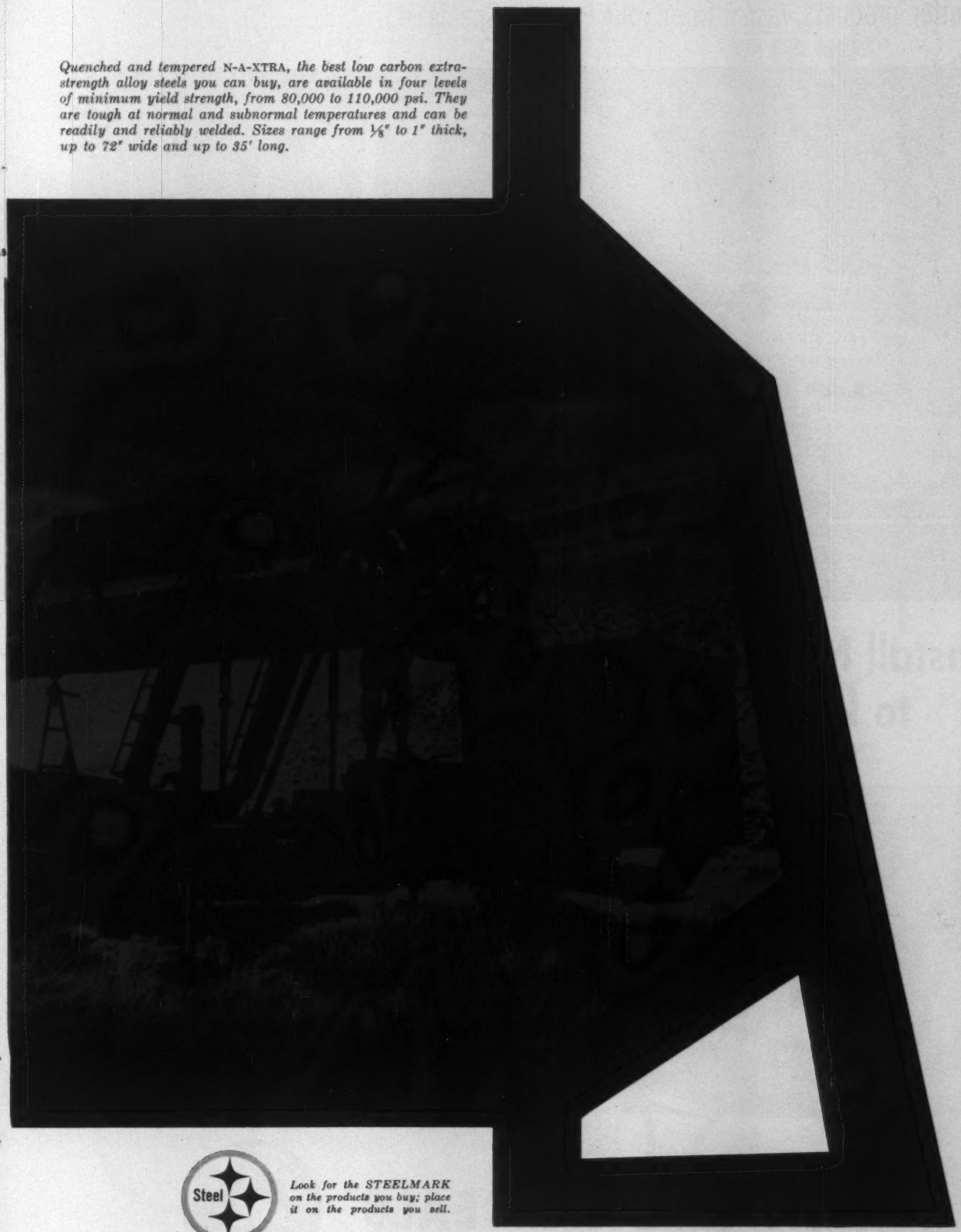
N-A-XTRA

A PRODUCT OF

GREAT LAKES STEEL

Detroit 29, Michigan

Quenched and tempered N-A-XTRA, *the best low carbon extra-strength alloy steels you can buy, are available in four levels of minimum yield strength, from 80,000 to 110,000 psi. They are tough at normal and subnormal temperatures and can be readily and reliably welded. Sizes range from ⅛" to 1" thick, up to 72" wide and up to 35' long.*

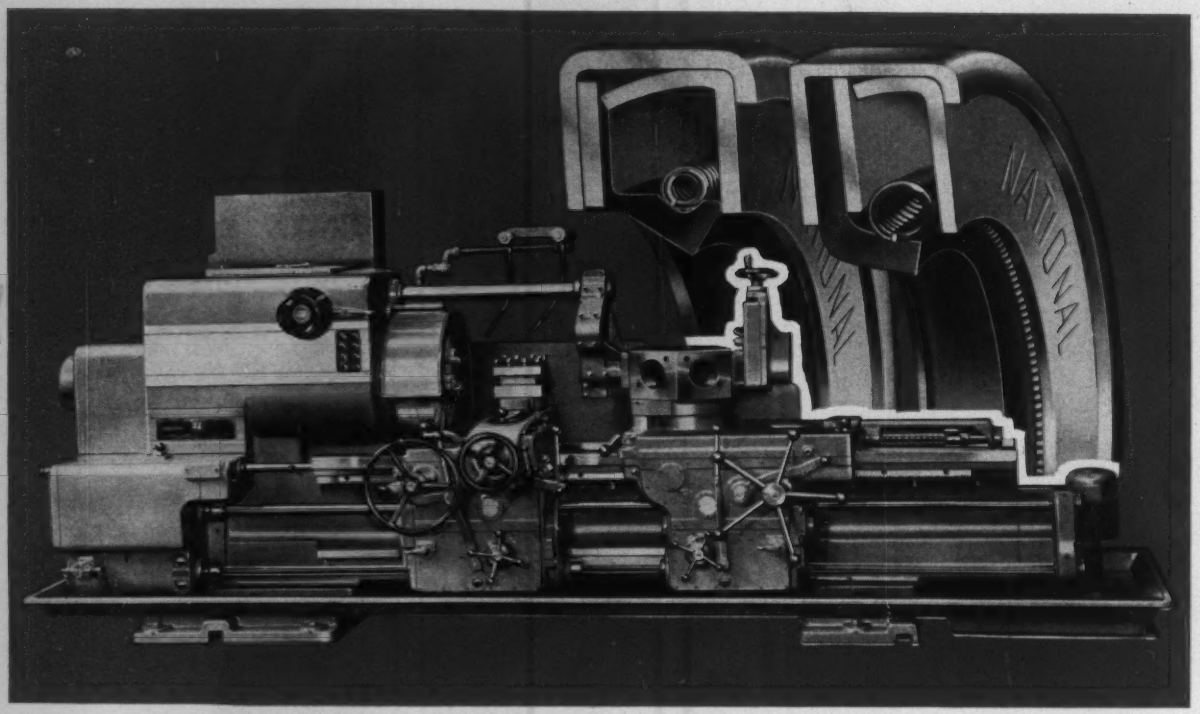


Steel

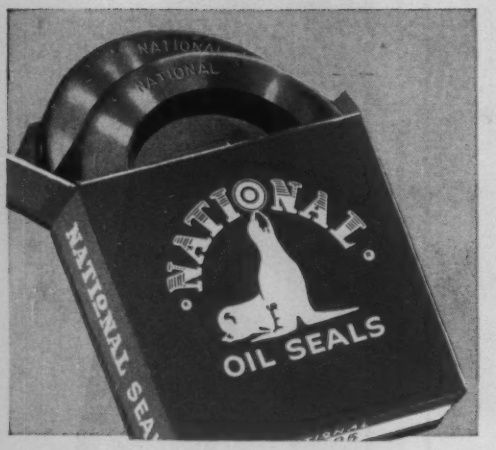
Look for the STEELMARK on the products you buy; place it on the products you sell.

Great Lakes Steel is a Division of **NATIONAL STEEL CORPORATION**

Better products, *faster,* from your Bearing Specialist:



Install National Oil Seals...low cost protection to keep machine output at peak levels



Your Bearing Specialist will help you set up a working stock to handle repair jobs in a hurry

You can depend on National Oil Seals to lengthen vital bearing life, cut downtime losses, and help hold production schedules. They're made to seal *in* lubricant, and seal *out* abrasive dirt. The key to this protection guarantee is the quality construction of every National Oil Seal.

National *Micro-Torc*® Seals feature specially processed leather that stays flexible, lasts longer, and runs cooler. *Syntech* rubber seals are specially blended to meet exacting conditions of temperature, shaft speed, and other critical factors. Both types come in all sizes and are always available for fast delivery whenever you need them. Call your Bearing Specialist. He's nearby for ready help.

NATIONAL OIL SEALS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

NATIONAL OIL SEALS

NEW HUGHES MT-3
AUTOMATES JOB LOT PRODUCTION

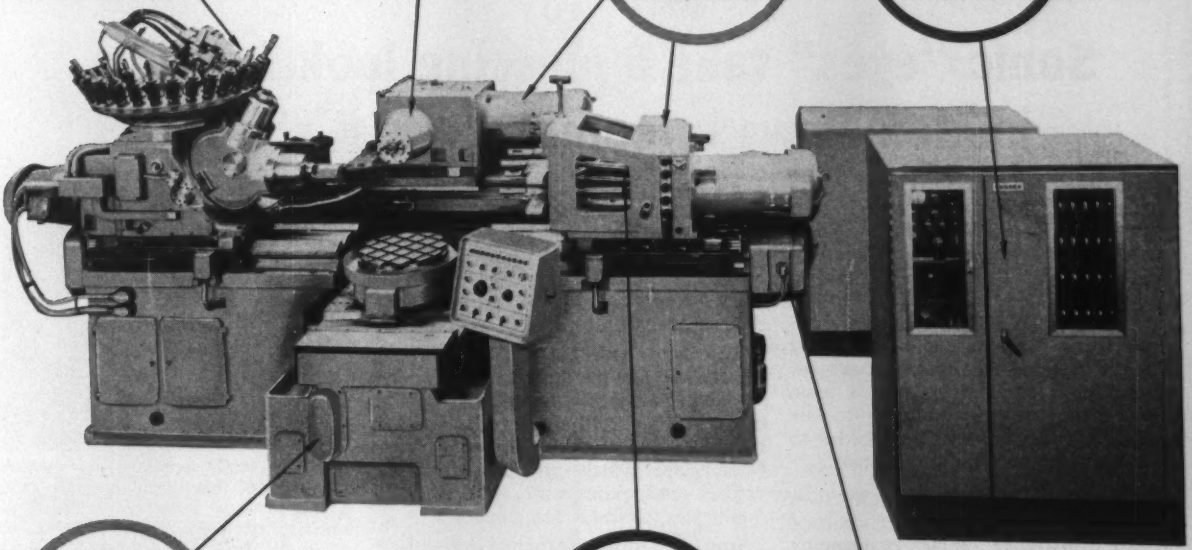
The new Hughes MT-3 replaces from three to six conventional machines. It drastically reduces costs by bringing production line efficiency to small lot manufacturing of parts requiring face and other milling operations, drilling, boring, reaming and tapping. Operating from numerical instructions programmed on tape, the system functions completely automatically. The MT-3 has an absolute positioning accuracy of ±0.0005". Its part size envelope is a twelve-inch cube, but in many cases will machine parts up to 12" x 24" x 24".

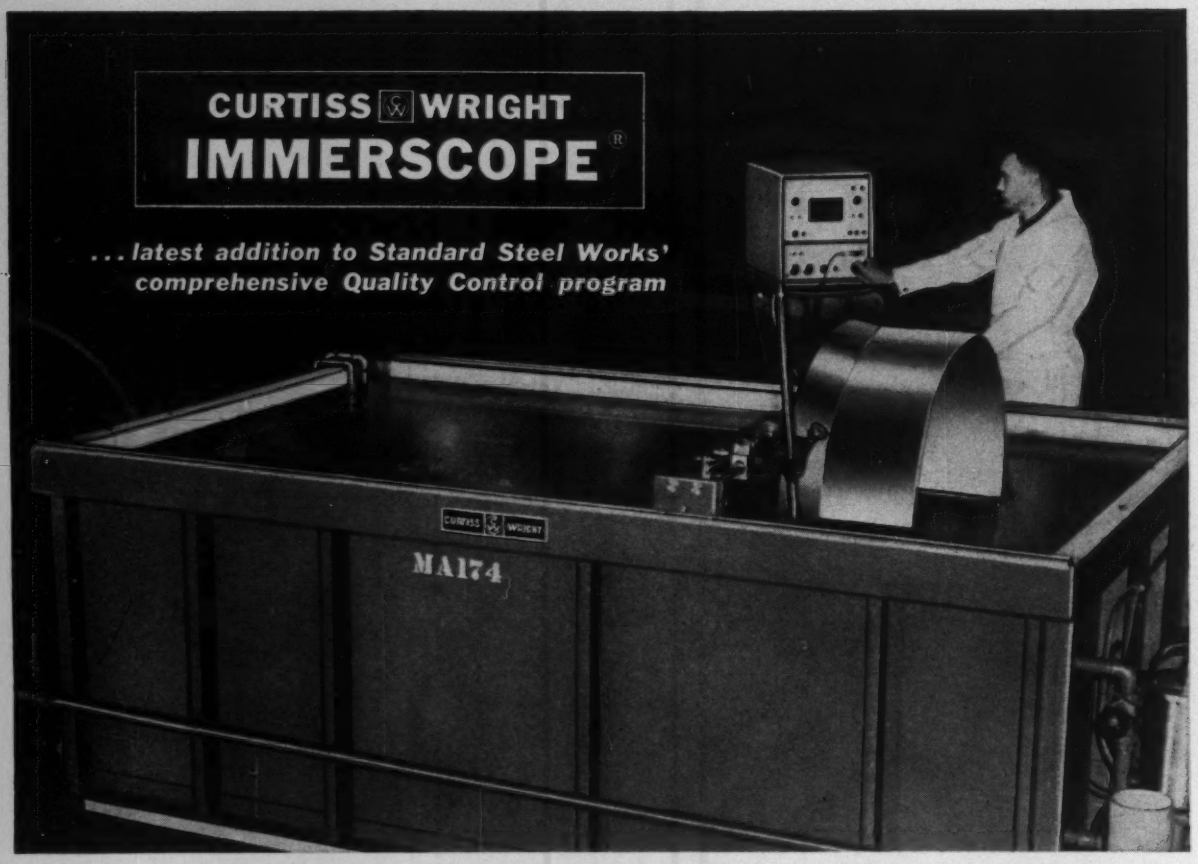
For complete engineering specifications, firm price and delivery dates write, teletype (TWX INGL 4117) or call collect: HUGHES INDUSTRIAL SYSTEMS DIVISION, P. O. Box 90904, Los Angeles 45, California.

CREATING A NEW WORLD WITH ELECTRONICS

HUGHES

HUGHES AIRCRAFT COMPANY
INDUSTRIAL SYSTEMS DIVISION


Universal Head—stores up to 30 tools. Changes tools automatically in less than three seconds.
Face Milling Head—handles cutters up to eight inches in diameter. Capable of climb milling.
Building Block Design—means you buy only the work capability you require. The Multiple Spindle Head and Face Milling Head are optional and may be added.
Hughes Numerical Control—quickly and precisely directs all machining operations from pre-programmed punched tape.
All axes equipped with Hughes patented Position Transducers. This means no deterioration of accuracy or sensitivity.
Multiple Spindle Head (shown) or Precision Boring Head optional.
All axes equipped with ball bearing lead screws and feed rate override controls.



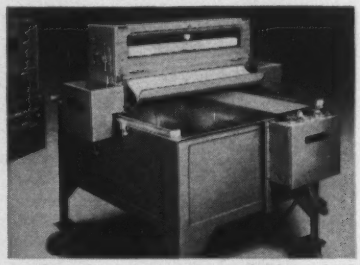
Sonic "eyes" take a piercing look for tiny, hidden flaws in complex steel shapes

Ultrasonic testing for tiny defects in vital parts with a Curtiss-Wright immersed inspection Immerscope is an important phase of the quality program at Standard Steel Works, major supplier of special alloy steel shapes of thin section and intricate forms. Because quality control at Standard is a highly regarded customer service, great emphasis is placed upon securing the most accurate, up-to-date testing equipment available in order to maintain a high level of accuracy.

Immerscope ultrasonic non-destructive testing is extremely versatile and accurate because of its range, rapidity of scanning and its high sensitivity in flaw detection. Variety of shapes and complexity of objects do not restrict complete inspection of the whole unit piece. Depth and relative size of flaws or voids are determined from the spacing and size of the pips on the cathode ray tube screen.

Defects as small as 0.0156" can be detected within the steel part under inspection. The large illustration shows a thin-wall ring, resting on rollers in the tank. The operator is at the controls of Immerscope which provides electronic control and progressive indication of findings as the test is being made.

For additional information phone SWinburne 9-0500 or write:

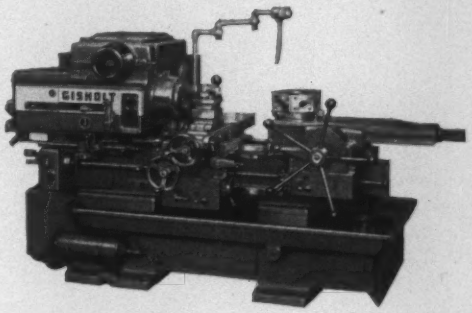


Packaged units are available which range from this small portable unit, having a tank with inside measurements of 4' long x 3' wide x 18" deep, to larger units with maximum dimensions of 54' long x 12' wide.

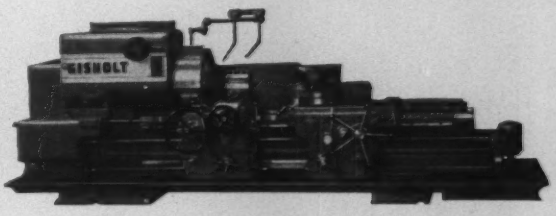
Princeton Division **CURTISS WRIGHT CORPORATION** Princeton, New Jersey

In CANADA: Canadian Curtiss-Wright Ltd. • 43 Westminster Avenue, North • Montreal 28, P. Q., Canada

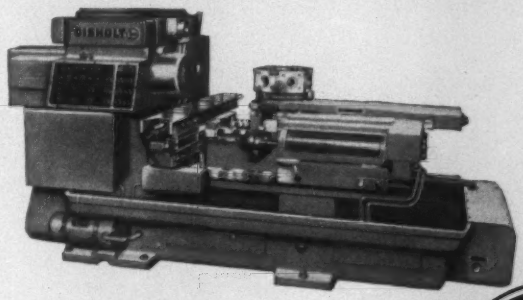
Inquiries from qualified Manufacturers Rep. invited.



Gisholt MASTERLINE Universal Ram Type Turret Lathe

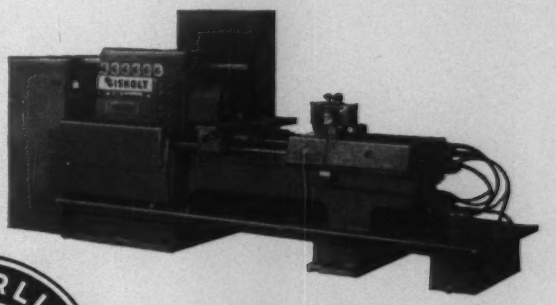


Gisholt MASTERLINE Saddle Type Turret Lathe

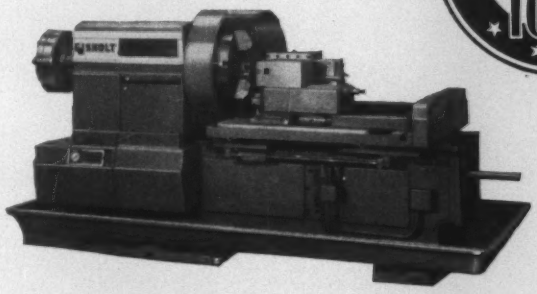


Gisholt MASTERLINE AR (Automatic Ram) Turret Lathe

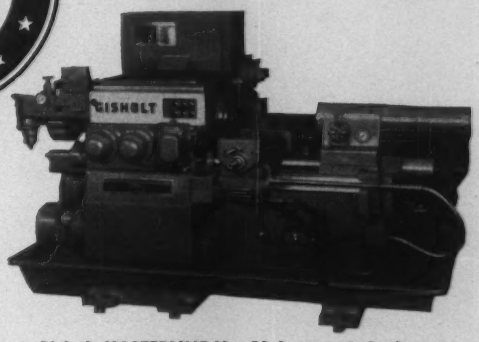
MASTERLINE GISHOLT SINCE 1887



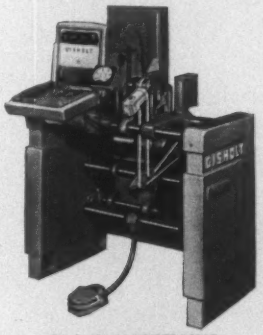
Gisholt MASTERLINE Fastermatic with FeeDial Control



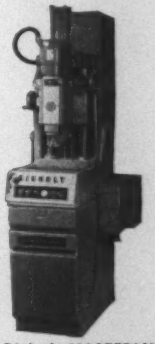
Gisholt MASTERLINE Simplimatic Automatic Lathe



Gisholt MASTERLINE No. 12 Automatic Lathe



Gisholt MASTERLINE Balancing Machines

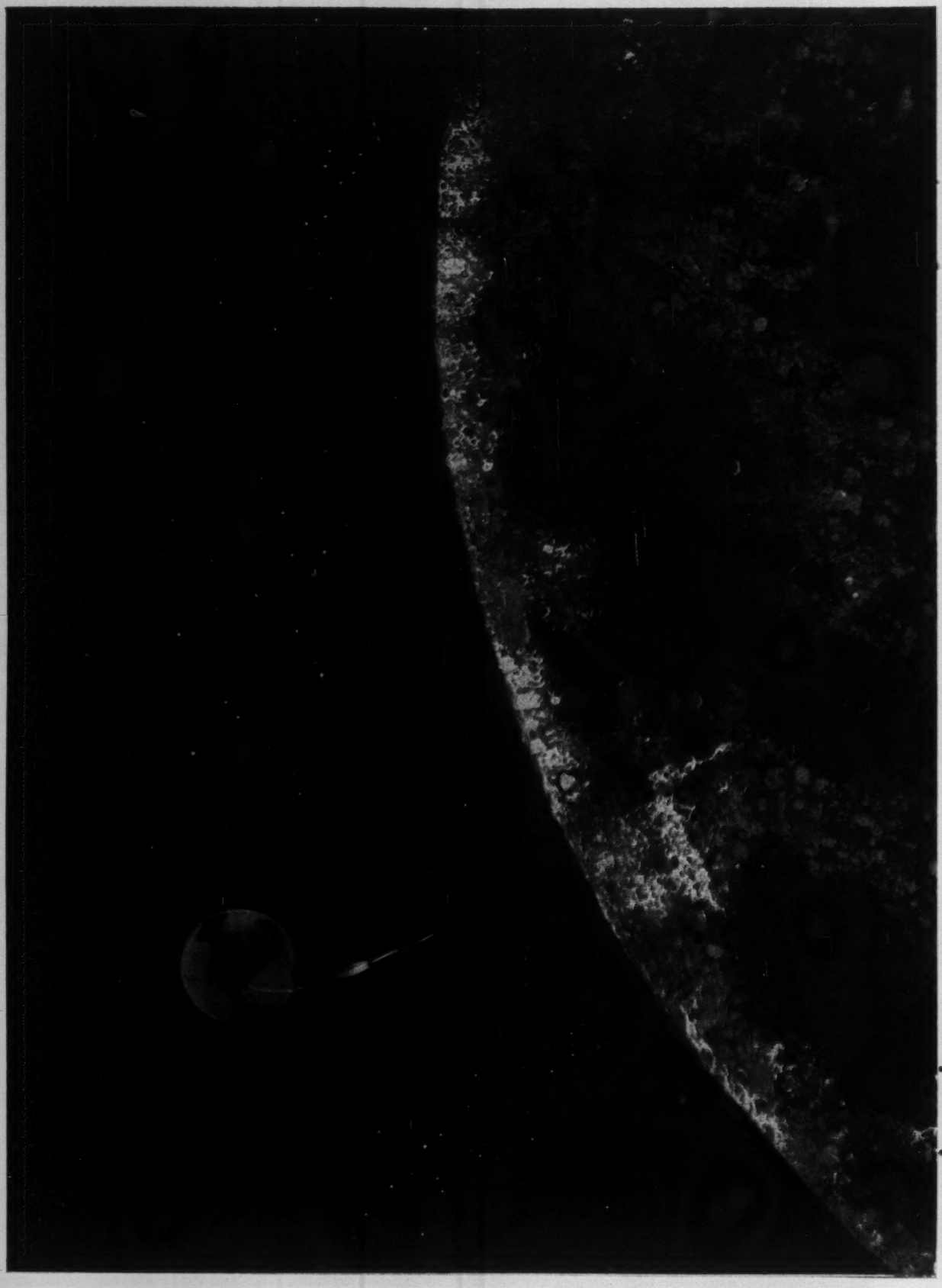


Gisholt MASTERLINE Superfinishing Machines

The illustrations on this page show the eight basic lines built by the Gisholt Machine Company. A General Catalog, Form 1126-N with complete specifications and basic information on the Gisholt MASTERLINE Machines, is available on request. Direct your inquiry to:

GISHOLT MACHINE COMPANY

1215 East Washington Ave., Madison 10, Wis.

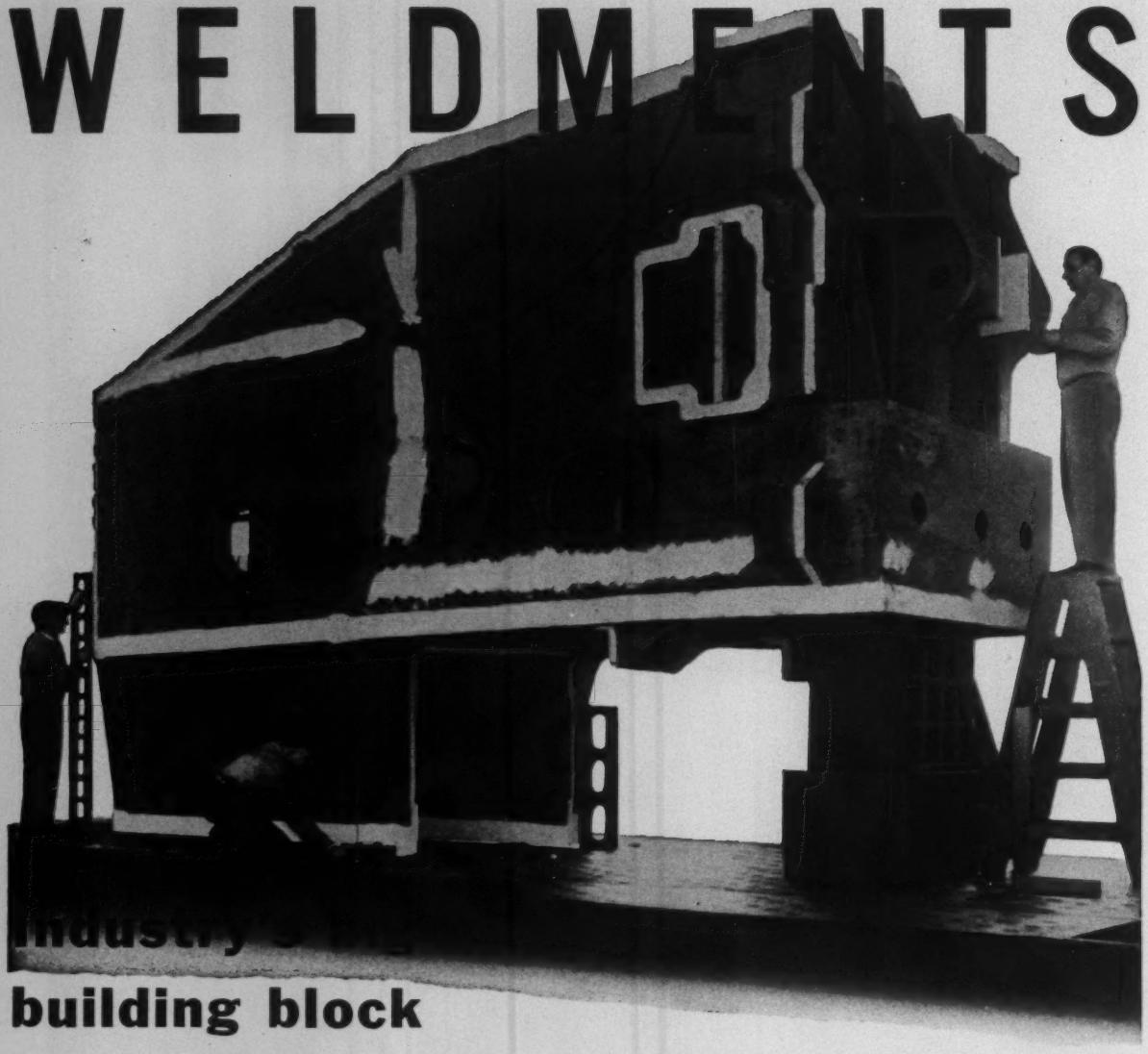


TARGET FOR TOMORROW

Each advance in man's probe of space is, in part, based on man's knowledge of the properties and capabilities of stainless steel. Men who design rockets, missiles and aircraft specify stainless for vital parts. Fabricators of earth-flight and space-flight equipment, seeking many types of stainless sheets and plates, call on Eastern . . . exclusive producer of stainless steel.

EASTERN
STAINLESS STEEL
BALTIMORE 3, MARYLAND, U. S. A.
stainless steel sheets, plates, strip, coils

WELDMENTS



building block

You're looking at a 55-ton weldment on a planer. It is typical of the machining—or building of a complete machine of any size—produced regularly in the Sun Ship machinery plant where marine and industrial equipment is built.

In our tank and steel fabricating shop, we build pressure vessels, fractionating towers, weldments, and heavy steel fabrications.

Our completely integrated shops concentrate facilities and skills for producing special machinery and components that meet the most critical standards.

When you need special machinery of any kind, you will want to discuss methods, equipment requirements and possible production layouts with Sun Ship's sales engineers.

Sun

SHIPBUILDING & DRY DOCK COMPANY

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That's the secret of good breeding . . . and why Federal Ball Bearings are all champions.

Take race grinding: the operator must gage race diameter, roundness, contour, centerline, eccentricity of raceway with O.D., parallelism of the race with the face of the bearing ring . . . and finish. Then line inspectors double check.

This is typical of the quality control all along the Federal production line. Double work? Sure! But it means a bearing as close to perfection as a bearing can get. One that's twice as reliable, too. That's why they're specified by so many top industrial companies. Why not put them to work yourself? Start today by sending for the Federal catalog where you'll meet hundreds of different type ball bearings . . . all top breed . . . in 12,000 sizes!

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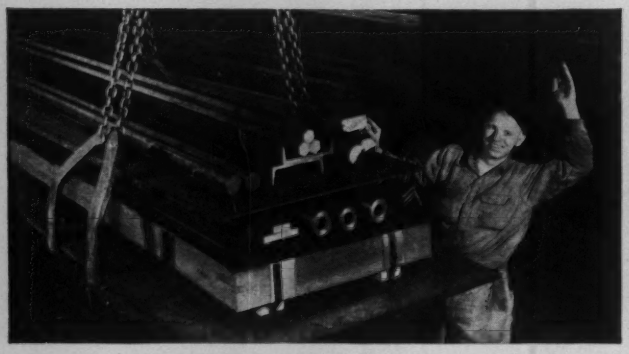
Unbiased recommendations . . .

STEEL . . . ALUMINUM . . .

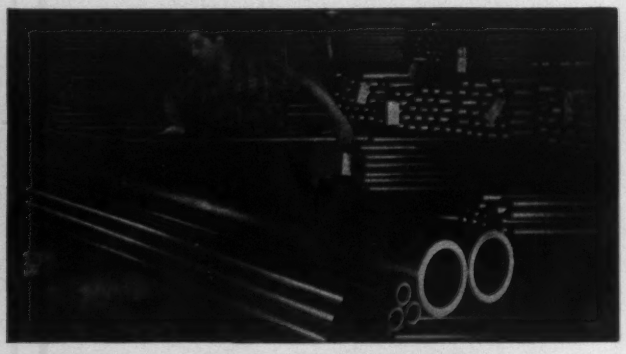
Because Ryerson is the nation's largest supplier of steel in all types and sizes—*plus* aluminum, plastics and machinery—you're assured of *unbiased* recommendations on materials and metal-fabricating machines to do your job best at lowest cost.

And along with the size and diversification of stocks comes this unsurpassed service: certified quality, on-time delivery, top technical help, 117 years of integrity.

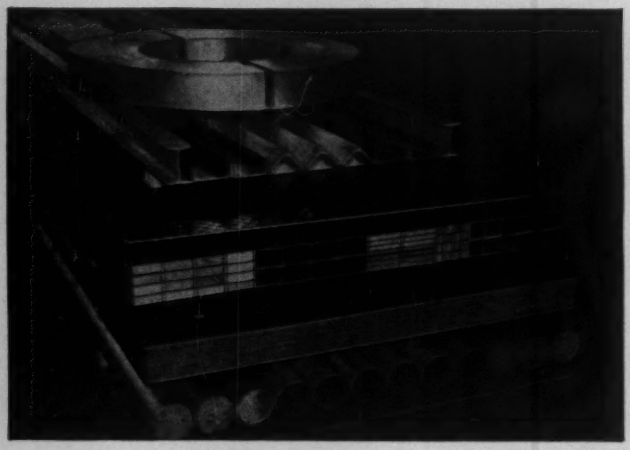
Put it all together and you have Metalogics—the Ryerson science of giving optimum value for every purchasing dollar. Ask your Ryerson representative for details.



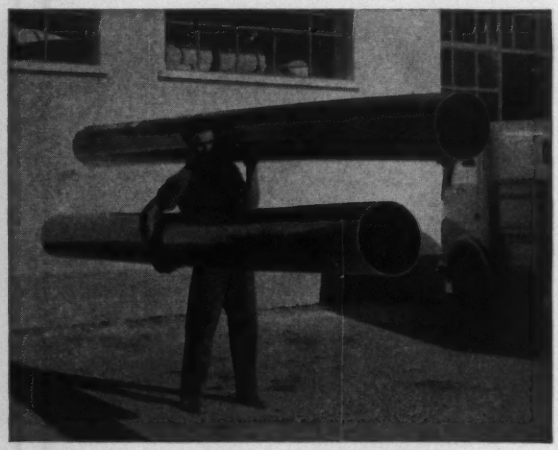
CARBON STEEL—No one even comes close to the size and diversity of Ryerson stocks of hot rolled carbon steel. All bars, structurals and plates are of known analysis or physical properties. Widely acclaimed accuracy of Ryerson sawing, shearing and flame-cutting is assured by published tolerances that are the most exacting in the industry.



TUBING AND COLD FINISHED BARS—Here again, Ryerson stocks are by far the nation's largest—including seamless and welded mechanical tubing; hydraulic cylinder and fluid line tubing; structural tubing; new Ledloy® 170 tubing, etc. And in cold finished bars—shafting, machinery steel, accuracy stock and screw stock, including fast-machining Ledloy 375 & 300.



ALUMINUM—Nation-wide Ryerson service on Reynolds aluminum includes all mill products—a full range of alloys, tempers, gauges and sizes. Stocks include: flat and coiled sheet; plate; tubing and pipe; wire, rod and bar; structural and extruded shapes; commercial building products and related items.

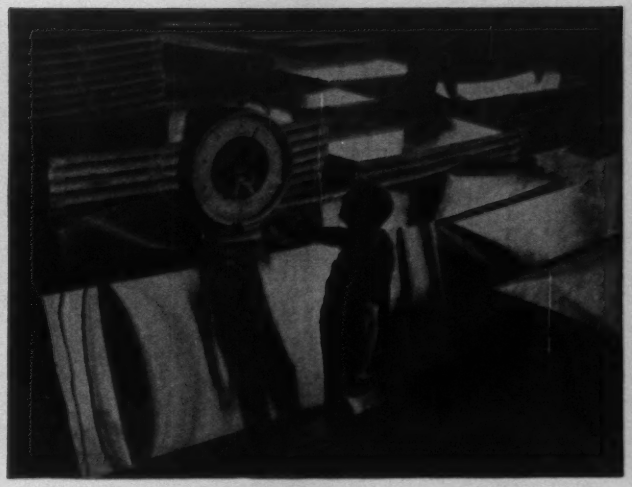


INDUSTRIAL PLASTICS—Call Ryerson for Ryertex-Omicron PVC pipe and tubing, sheet and rod: plastic that conquers more than 281 corrosive liquids and gases—will not weather, rot or age. Also for rigid Kralastic and flexible polyethylene pipe, and Ryertex® laminated phenolic resin plastics in sheets, rods and tubes . . . special shapes molded to your specs.

unequaled service on

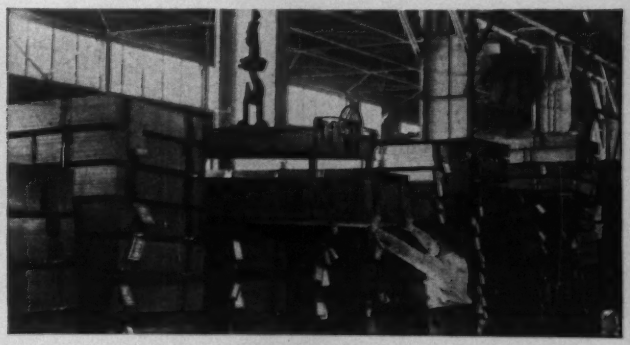
PLASTICS...MACHINERY

ALLOY STEEL—Ryerson developed and perfected a plan to assure risk-proof alloys through an 8-Step Certified Quality Program—and leads the industry in size and diversification of stocks, including case-hardening, direct-hardening and heat-treated alloys; leaded alloys, including Rycut® steels (fastest-machining in their carbon ranges); aircraft quality alloys, etc.



STAINLESS STEEL—2351 sizes, shapes, types and finishes of stainless in Ryerson stocks. All certified to meet ASTM, SAE, Military, DuPont or G.E. specifications—assuring close control over chemical composition and mechanical properties. Call us for all your requirements on stainless sheets, plates, bars, pipe and fittings and tubing, heads and machine-cut rings and discs. Cutting facilities include latest Heliarc equipment.

METALWORKING MACHINERY—More than 3800 types and models of machinery and tools produced by nearly 100 of the nation's leading manufacturers are available through the Ryerson Machinery Division. The broadest line available from a single source includes equipment for bending, braking, forming, hoisting, drilling, pressing, punching, rolling, sawing, shearing, threading, welding. Also, material handling equipment.



SHEET AND STRIP STEEL—More than 20 kinds. Hot rolled, cold rolled and pickled and oiled—tight-coated galvanized and galvannealed—Ryex® expanded metal, perforated sheets, etc. Latest shears, slitters, and cut-to-length lines enable us to give fast delivery on every requirement.

METALOGICS

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL®

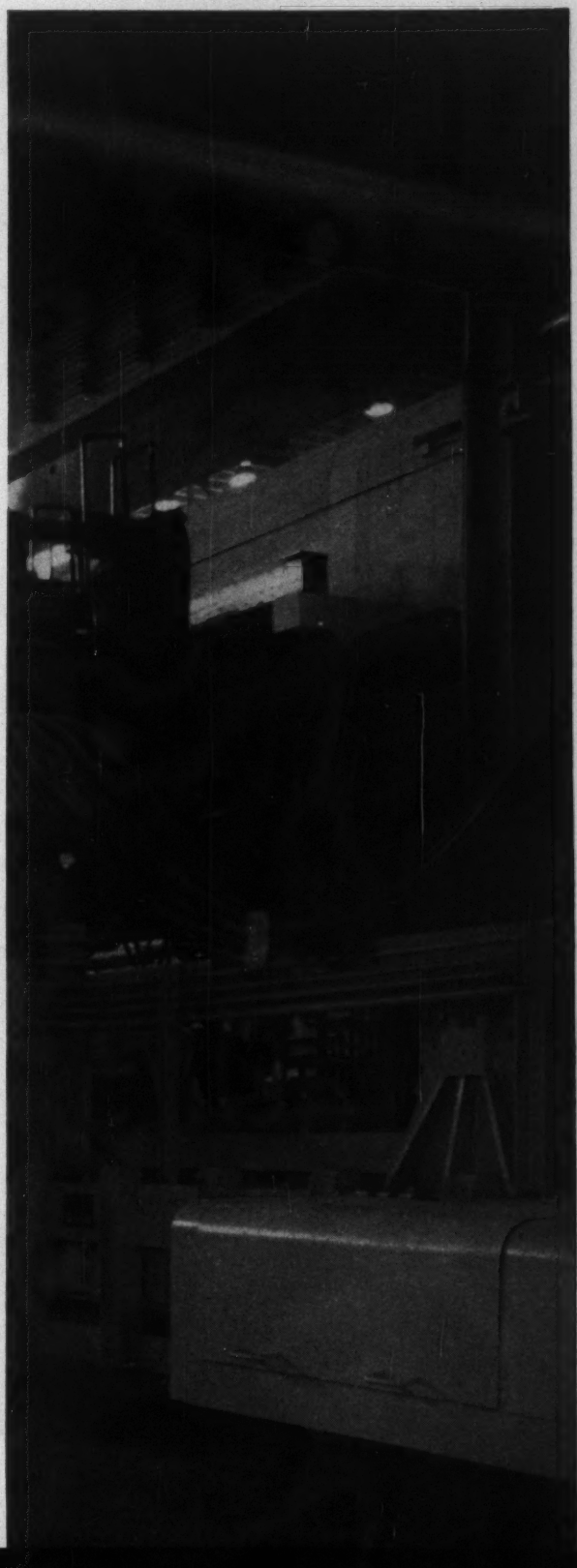
Joseph T. Ryerson & Son, Inc., Member of the INLAND Steel Family

SERVICE CENTER PLANTS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

At Kennecott's new refinery... Twin Heroult Electric Furnaces designed

Copper cathodes are charged into the 13,500 KVA Heroult 90-ton electric arc furnace, one of two at Kennecott Refining's new plant south of Baltimore. American Bridge also fabricated and erected the plant's structural framework.

to keep 16,500-ton per month copper melt on schedule



Kennecott Refining Corporation's electrolytic copper refinery near Baltimore is the country's newest—a showplace of efficiency. One reason: a pair of 90-ton Heroult electric arc furnaces, each rated at 40 tons per hour.

Of nose-tilt design to facilitate launder pouring, they discharge a steady stream of molten copper (2150°) which is used in the horizontal casting of wire bars and the continuous casting of billets. One Heroult is on normal capacity operation while the other is a spare for use during relining, when the pre-heat furnace is down, or when additional production is required.

Copper cathodes are preheated to about 1400°F and door charged into the Heroult arc furnace on a peel arm crane. The three-phase power input utilizing ultra-high speed mechanical positioning for three 20" electrodes with high-speed sensitive regulators maintains a constant arc above the copper bath for uniform temperature casting.

The two 90-ton Heroult arc furnaces can be tilted 40° forward and 15° backward. They feature mechanically positioned masts and special water-cooled skew-back roof rings that introduce water flow at the critical roof juncture to prevent warpage and burn out.

Whatever your arc-melt problem there is a Heroult electric arc furnace design for you. We've made them from 3 tons to over 200 tons capacity, for both swing roof top charge or door charge operation. They can accommodate induction stirring equipment, and can be designed for duplexing arrangements. And every Heroult is designed for maintenance by your own crew.

American Bridge has a complete electric furnace service that includes new installation, furnace modernization and part replacement. We'll be happy to quote on your building needs, too. Call our nearest office.

USS and Heroult are registered trademarks

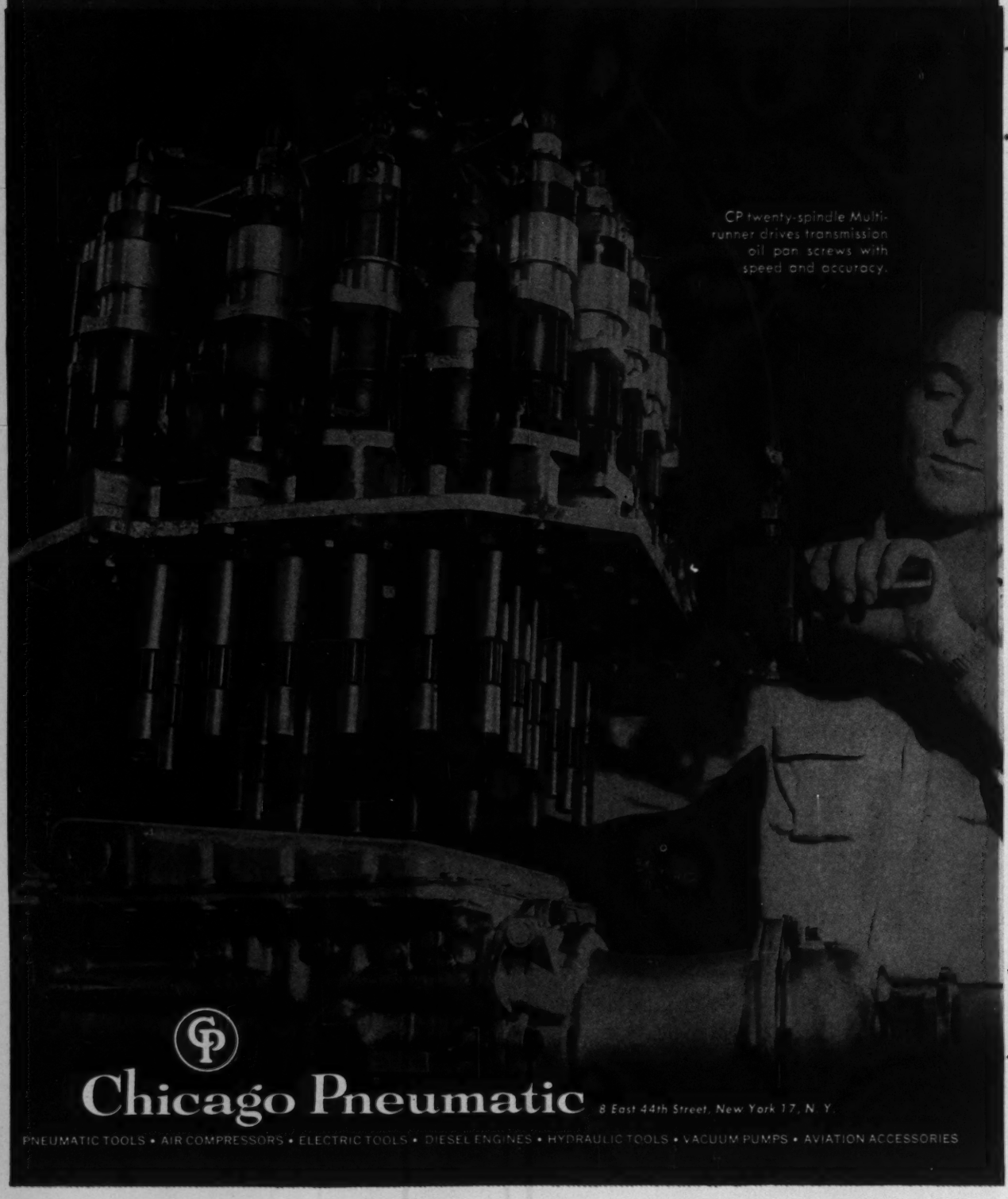
American Bridge Division of United States Steel

USS

General Offices: 525 William Penn Place, Pittsburgh, Pa. Contracting Offices in New York, Philadelphia, Chicago, San Francisco, and other principal cities.
United States Steel Export Company, New York

This mark tells you a product is made of modern, dependable Steel.

Fastener driving is our business . . .



CP twenty-spindle Multi-runner drives transmission oil pan screws with speed and accuracy.

Chicago Pneumatic 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

"One-Shot" Torque Control our specialty

CP adds 4 Really New Tools to "industry's most extensive line"

Three radically new types of drivers, and a new, compact Torque Analyzer that makes testing and calibrating of Torque Control power tools fast have been added to the CP Line . . . show why CP is the acknowledged leader in the fastener driving field.

Chicago Pneumatic fastener drivers have earned their reputation for fast, efficient performance on today's high-speed assembly lines. The CP Line . . . the most productive line of "one-shot" Torque Control Multiple-Motors, straight and angle Screwdrivers and Nutrunners, and Impact Wrenches . . . is the most complete in the industry.

If your assembly problems demand specified torque settings to meet high quality standards . . . if you must maintain consistent accuracy to minimize spoilage and rejects . . . you will find a real "pay-off" when you let the CP man help you solve your production bottlenecks.

To get all the facts on CP "One-Shot" drivers for hand held or multi-spindle requirements . . . use the handy coupon below. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

NEW CP-200 Torque Analyzer tests and calibrates torque control power tools

NEW CP-3017 Dial Tork Nutrunner, the only instantly adjustable power tool that inspects as it drives.

NEW Micro-Tork Screwdrivers for large or small fasteners.

NEW CP-3090-ATN-300 "jolt-free" Angle Nutrunner.

GET 12 PAGES OF STRAIGHT FACTS ON "ONE-SHOT" TORQUE CONTROL TOOLS. USE THIS COUPON TO MAKE SURE OF YOUR FREE COPY.

Chicago Pneumatic Tool Co., Dept. I-120
8 East 44th Street, New York 17, N. Y.

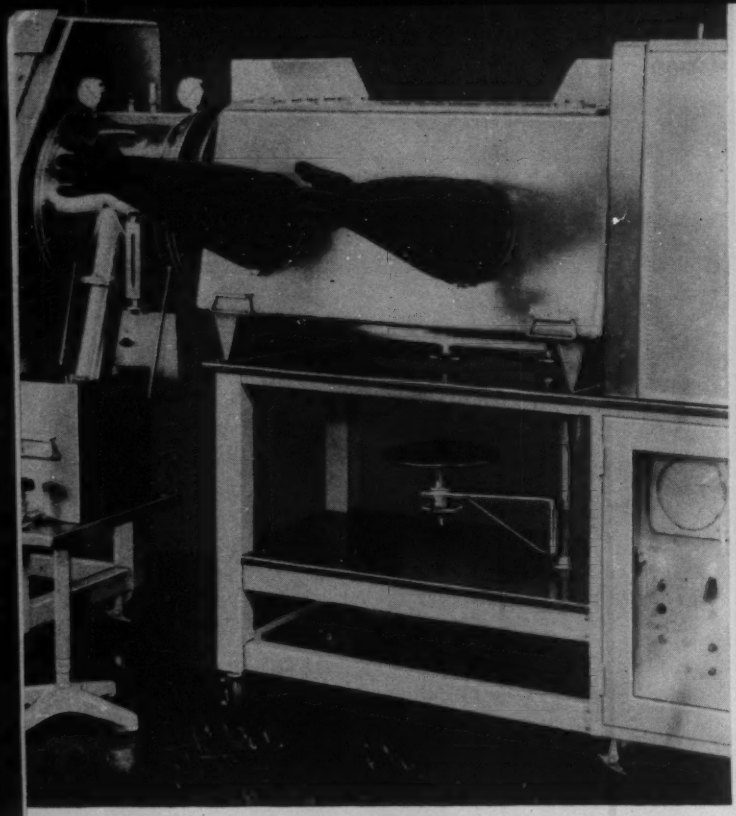
Please send a copy of SP-3266, your 12 page color booklet on "One-Shot" Torque Control Screwdrivers, Nutrunners, Angle Nutrunners, Multi-Runner Motors and Torque Analyzers.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____



...CLEAN

When laboratory people talk of an "absolutely sterile environment" they mean just that. Only Stainless Steel can help make it that way. In this germ-free system, spot-welded Stainless Steel with molded silicone-rubber gaskets helps maintain a sterile environment for breeding germ-free animals. The apparatus is used to study infectious diseases, immunochemistry and cancer. Stainless Steel is easily cleaned because its smooth, pocket-free surface can't harbor contamination.

DIRTY...

Few things are dirtier than wet coal fines. And corrosive. The combination of moisture and sulfur eats away most materials in nothing flat. Not Stainless Steel. Stainless has exceptional corrosion resistance to anything that can happen in coal or ore processing. Screens, chutes and other handling equipment are easily fabricated from Stainless Steel. Stainless even has what they call "slideability"; its smooth surface prevents build-up and clogging. And it lasts up to 10 times longer than other materials.

USS Stainless Steels... no other metal makes such a material difference in so many applications

This mark tells you a product is made of modern, dependable Steel.

...and in between

No material can match Stainless Steel's versatility. Stainless Steel offers designers and fabricators a unique combination of properties: superior strength, extraordinary corrosion resistance to an enormous variety of reagents, outstanding high temperature properties, and excellent appearance. It is easily fabricated and, because Stainless Steel lasts longer, actually costs less in the long run. If you have a selection or delivery problem, ask your USS representative or nearest steel service center.

USS is a registered trademark

USS

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
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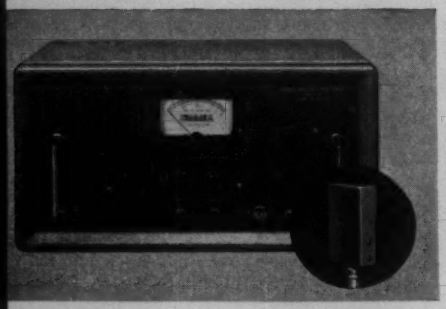
United States Steel

Watch United States Steel's special Christmas show, **The Coming of Christ,** in Color on NBC-TV, Wednesday, December 21, 8:30 P.M., E.S.T.

NEW ADVANCEMENTS ON THE METAL FORMING FRONT

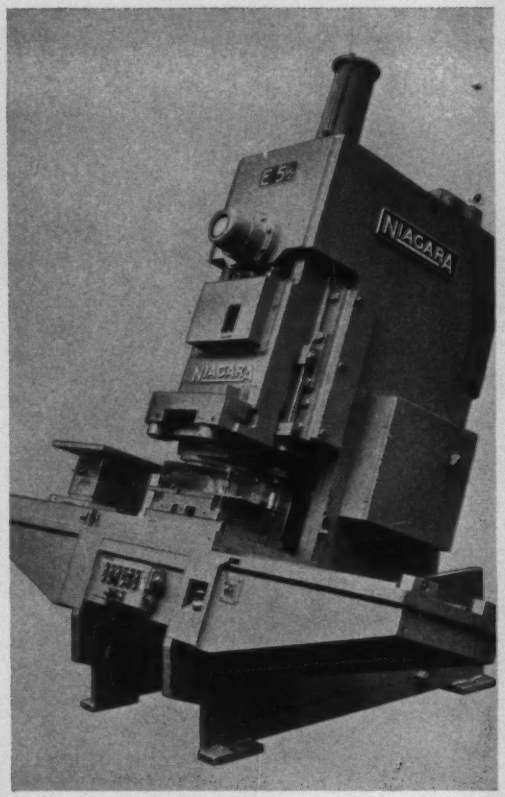


ELECTRONIC PRESS LOAD MONITOR ACTUATES SIGNAL OR DISENGAGES CLUTCH WHEN OVERLOAD OCCURS

Niagara's new Press Load Monitor, an electronic precision instrument, continuously measures and visually indicates all loads on a press during die setup or production. When a preselected press load is reached, a tripping circuit disengages the clutch to prevent overload repeats, or actuates a warning signal. Consisting of 2 or 4 pickups mounted permanently to press frames or tie rods, and a control unit located near the press, Load Monitor instantly indicates press loads from 0 to 140% of press capacity regardless of press speed. Key-locked controls prevent tampering by unauthorized personnel. Request *Product Report No. 2.*

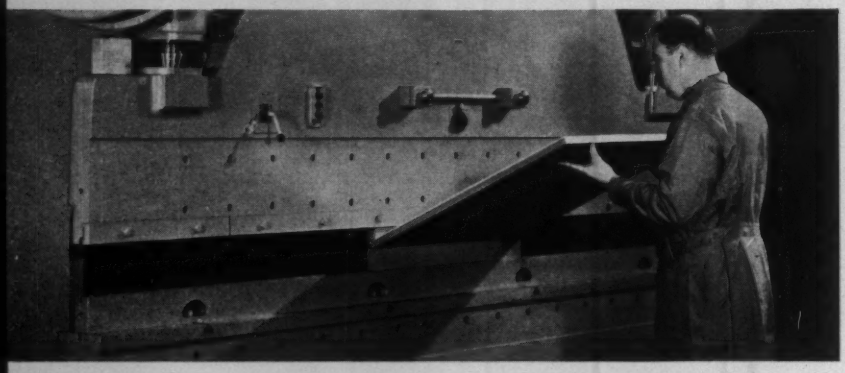
PORTABLE ELECTRONIC TONMETER MEASURES LOADS TO SAFEGUARD DIES AND PRESSES

The Niagara Portable Transistorized Tonmeter is an accurate, fast-response instrument for measuring loads imposed on a press or battery of presses during production or die setup. Pickups placed on press frames sense the intensity of loads. Large indicator, reading in percentage of press capacity, shows the maximum load during the press cycle. Because battery-powered unit requires no electrical outlet and is easy to carry, one individual can check several presses in minutes. Unit is designed to prove its calibration and test its own battery to be sure operating power is within prescribed limits. Request *Product Report No. 2.*



SLIDING BOLSTER PRESSES SLASH DIE CHANGEOVER TIME

Niagara presses arranged with Sliding Bolsters save hours of setup time on work requiring frequent die changes. On inclinables, straight sides, or other Niagara presses, sliding bolsters permit die removal or replacement in minutes instead of hours. Floating on a "cushion of air," dies can be easily moved into and out of work area by hand. Optional features for the slide may include power or manual die clamps, power or manual slide adjustment, shut height position indicator, semi-automatic slide positioner. Request *Product Report No. 1.*



AUTOMATIC STROKE CONTROLS PREVENT PRESS BRAKE "WHIP-UP"

Two automatic stroke control systems recently developed by Niagara are making new press brake efficiency and operating safety a reality.

The first, an Alternating 2-Speed Stroke Control, for press brakes with air clutches, increases production by providing a positive means of avoiding "whip-up" and "back bending" during high speed operations involving wide sheets. Following a fast approach, ram speed is automatically reduced during the working portion of the stroke, then automatically increased for a fast return to top of stroke. Because slipping the clutch is no longer necessary, less operator skill and experience are required. Clutch burnouts are prevented. Work spoilage resulting from back bends is eliminated. Selector switch offers choice of three stroke-speed combinations. Request *Product Report No. 3.*

The second, an Automatic Ram Arrestor, is available for both air and mechanical clutch machines. Following a fast approach, ram is automatically *stopped* at a predetermined point just before it touches the work. Ram can then be "inched" through the bending portion of the stroke, avoiding whip-up and back bending. It may then be returned to top of stroke at high speed. Since inching is confined to such a small portion of the stroke, operating cycle is faster... operator fatigue and clutch wear are reduced. Even inexperienced operators can perform safely and efficiently with minimum work spoilage. A single adjustment permits the stopping point to be matched to die and material. Request *Product Report No. 3.*

NIAGARA

NIAGARA MACHINE & TOOL WORKS
683 Northland Avenue, Buffalo 11, N. Y.

USERS PROVE:

ALCO HI-QUA-LED STEEL FORGINGS CUT MACHINING COSTS UP TO 50%

how three leading companies save money with ALCO Hi-Qua-Led steel forgings

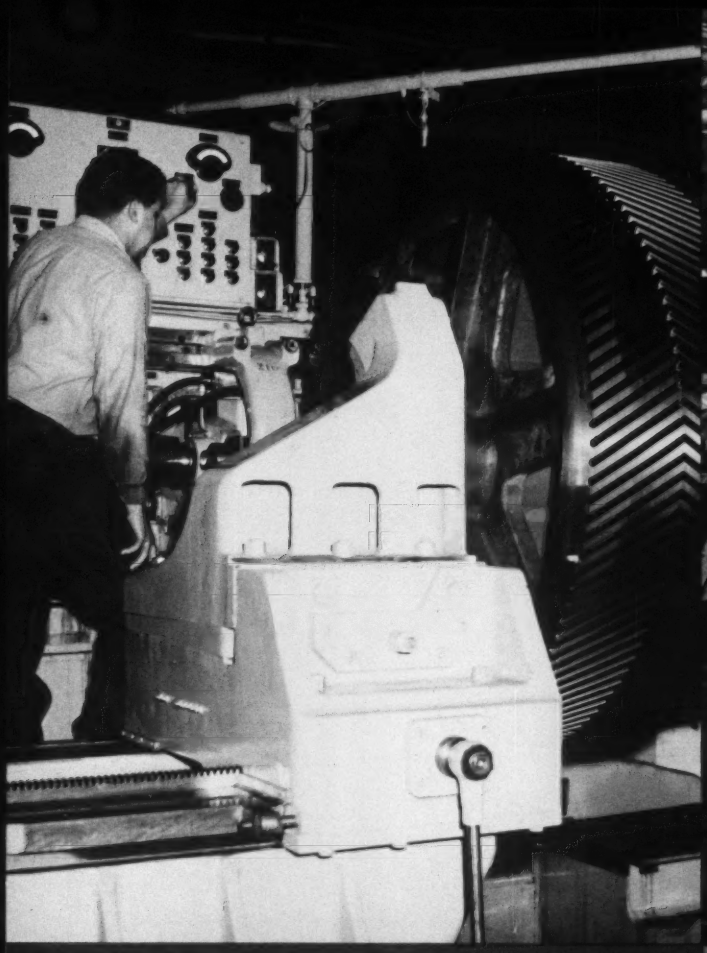
case report:

HI-QUA-LED FORGINGS CUT MACHINE TIME 45%

THE TOOL STEEL GEAR & PINION CO., Cincinnati, achieves large savings in gear-machining operations with ALCO's Hi-Qua-Led Steel forged and rolled rings. On one gear ring, for example, Tool Steel reduced turning time 22% before hardening, and 42% after hardening. Gear hobbing time was cut 43%, rebore 45% and key seating 50%. Average time reduction was 45%.

Hi-Qua-Led forgings machine this easily because of a lead additive which increases shear angle and reduces tool friction. Result: heavier cuts and higher cutting speeds. Expensive tooling lasts longer—five, 10, even 100 times longer.

These big savings are only part of the story. Because Hi-Qua-Led forgings have the same mechanical properties as regular forgings of the same grade, Tool Steel can stand squarely behind its unique guarantee: "Any deficiency made good by cash or new materials."



case report:

HIGHER QUALITY GEARS FOR THE SAME COST

LUFKIN FOUNDRY & MACHINE CO., Lufkin, Tex., uses Hi-Qua-Led forged and rolled rings for 80 in. diam. herringbone gears in its large oil-well pumping units. Previously, cast rings had been used.

Lufkin F&M finds that, although the Hi-Qua-Led rings' price is higher, their machinability cuts the cost of the finished fabricated gear to that of the cast gear. Lufkin is thus able to put a better, more uniform gear in its pumping units for the same cost and provide improved equipment and higher value to its customers.

The table below shows how Hi-Qua-Led rings reduced machining costs at Lufkin F&M.

HI-QUA-LED RING vs CAST RING

OPERATION	CASTING	HI-QUA-LED	HI-QUA-LED SAVINGS
Turning	20 hours	8.1 hours	59.5%
Shape Teeth	80 hours	60 hours	25%
Tool Expense	$75.00	$25.00	67%

case report:

INCREASED CAPACITY WITH NO ADDITIONAL INVESTMENT

WARNER & SWASEY CO., Cleveland, uses Hi-Qua-Led open-die forged bars for the pentagon-shaped tool holders in their 2AC and 3AC automatic chucking machines. It adopted Hi-Qua-Led for this job three years ago, because it found that machining speeds on every operation—turning, milling, sawing, trepanning, grinding and drilling—could be increased by at least 50%.

The decrease in machining *time* Warner & Swasey gets is about 3 hours per forging. This compensates for the extra cost of Hi-Qua-Led. But Warner & Swasey reasons that Hi-Qua-Led actually expands its production capacity, without any added investment in factory or tools. This is worth about $60 per forging, according to Warner & Swasey figures.

ALCO

ALCO HI-QUA-LED STEEL FORGINGS RAISE PROFIT WITHOUT LOWERING QUALITY

While lowering machining costs, ALCO Hi-Qua-Led forgings have the same mechanical properties as regular forgings of the same grade. "In use" tests show that tensile strength, impact, fatigue and other properties are unchanged. Further, ALCO's exclusive patented lead-addition process guards against lead inclusions or segregates. You get the high quality you expect in custom-forged material.

Hi-Qua-Led Steel rings and forgings are furnished in any steel analysis. If you wish, ALCO will make up your order of regular forgings and include in it a Hi-Qua-Led forging, at no extra cost, for ALCO-supervised tests in your own plant. ALCO Products, Inc., Dept. 1501, Schenectady 5, N. Y.

SIZES AVAILABLE

OPEN DIE FORGINGS—RECTANGULAR
Maximum width—32 in.
Maximum height—32 in.
Maximum length—40 ft.
Maximum weight—36,000 lb
Minimum weight—1,000 lb

MANDRELLED RING FORGINGS
Maximum OD—92 in.
Minimum OD—24 in.
Maximum width—60 in.

OPEN-DIE FORGINGS—ROUNDS
Maximum OD—36 in.
Maximum length—40 ft
Maximum weight—36,000 lb
Minimum weight—1,000 lb

ROLLED RING FORGINGS
Maximum OD—160 in.
Minimum OD—18 in.
Maximum width—24 in.

ALCO FORGINGS

ALCO PRODUCTS, INC.

NEW 'BUFFALO' NO. 20

DRILLING MACHINE

Entirely new from the ground up . . . designed and built to give you the same consistent accuracy and extended service for which the complete 'Buffalo' drilling machine line is so well known.

Check These Features of the No. 20:

- **Designed for operator's convenience.**
- **Front-Mounted "Start-Stop" Push Button Switch.**
- **5-Step Pulley Drive (Or Optional Variable Speed Drive).**
- **Power Feed or Sensitive Hand Feed.**
- **Capacity: 1" in Mild Steel.**
- **Hinged Belt Guard Speeds Belt Changing.**
- **Positive Frame-to-Column Locking Device.**
- **Hand-Adjustable Spindle Return Spring.**

Available in floor, bench and pedestal models . . . one to six spindles.

For full details on the all-new No. 20 Drill (or any other model from the complete 'Buffalo' line), contact your 'Buffalo' Machine tool dealer or write us direct.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

MACHINE TOOL DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

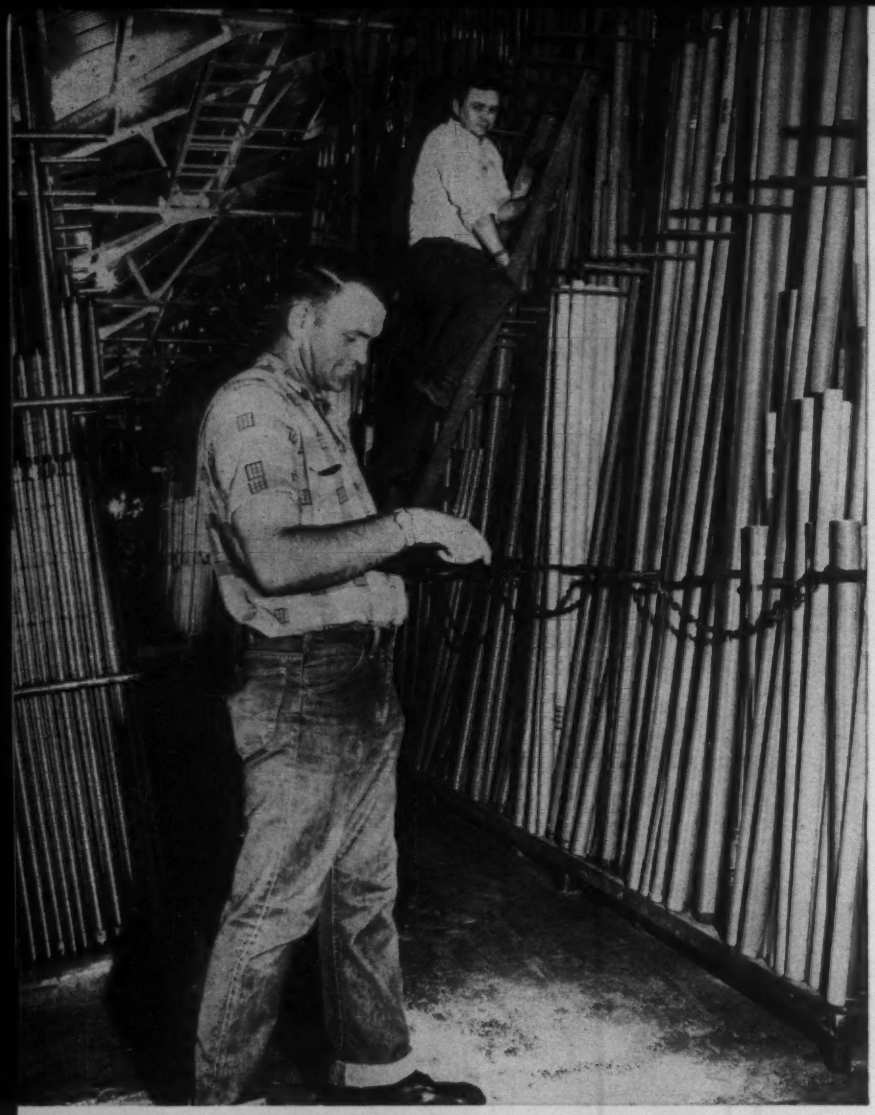
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.



SEAMLESS STEEL BARRELS and other pump components of Harbison-Fischer's rod and tubing displacement pumps show great size range required to bring oil to the surface. Pumps vary on I. D. from ¾ inch to 5¾ inches; from 3 to 42 feet in length. Harbison-Fischer counts on commercial quality Pittsburgh Seamless Mechanical Tubing to get a 4 to 6 micro-inch I. D. finish with minimum clean-up expense.

Pittsburgh Seamless Tubes Give a Lift...

WHEN OIL MEN MAN THE PUMPS

When the gusher quits gushing and the oil flow slows to a trickle, it's time for oil men to man the pumps.

Pittsburgh Steel Company helps give them the lift they need with seamless mechanical tubing for sub-surface displacement pumps made by Harbison-Fischer Manufacturing Company of Fort Worth, Texas.

Nine of every ten producing wells must be pumped—and most depend on slender, precision-made rod and tubing pumps for efficient oil production. Harbison-Fischer has supplied them to the oil industry for more than 25 years—"The Best Pumps in the Oil Patch."

Among its eight types and wide range of sizes, there's a Harbison-Fischer pump to match every lifting job and well condition, whether it be depth, heat, pressure, corrosion or abrasion.

Pittsburgh Seamless Mechanical Tubing forms the pump barrel that contains plungers and valves. Besides destructive conditions below surface, barrels often must bear the weight (5 to 6,000 psi) of a fluid column of oil 10,000 feet or more deep.

● **Tight Specs**—To meet rigid API standards as well as its own manufacturing needs, Harbison-Fischer requires mechanical tubing with exact chemical and physical properties, and close tolerance I. D. and wall dimensions.

It demands tubing that is exceptionally straight, free of seams, laps and pits; made of steel that is machinable, and—in the high carbon range—fine grained and hardenable.

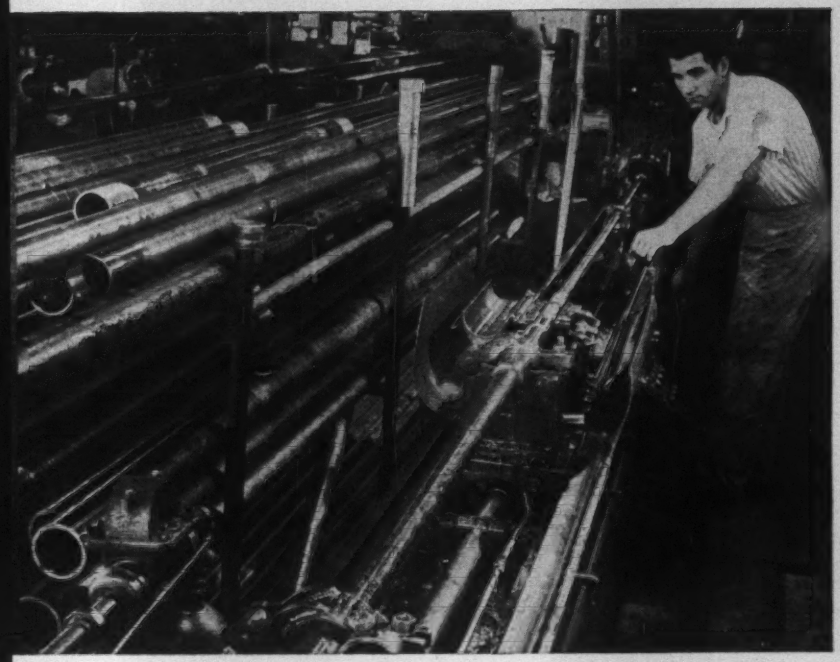
Pittsburgh Steel answers these requirements with mechanical tubing in C-1015 and C-1040 grades in commercial quality to help Harbison-Fischer hold processing to a minimum.

● **Fine I. D. Surface**—In production, Harbison-Fischer wants minimum stock removal to obtain a mirror I. D. finish and extreme straightness.

On its dozen long-stroke hydraulic hones, H-F holds the I. D. stock removal to a few thousandths of an inch. Says Harbison-Fischer:

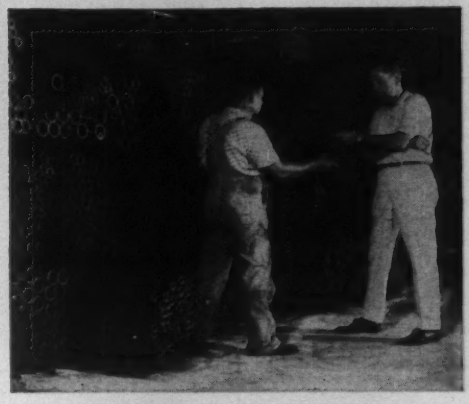
"The honed I. D. must be entirely free of pits. We want a four to six micro-finish. So you can see why the tubing's I. D. mill finish is important."

After threading and honing, every barrel is re-straightened to a tolerance of .015 TIR (total indicator



STRAIGHTNESS, CLOSE TOLERANCE wall thickness and absence of seams, laps and pits in Pittsburgh Seamless Tubing mean fast, easy clean-up on horizontal hones. Minimum stock removal in honing tube's inner surface results in a mirror finish. Six-foot tube being set up here will become working barrel of two-inch tubing pump.

HONED TUBE GETS RIGID INSPECTION. Inspector uses I. D. micrometer to make certain barrel of 3-inch tubing pump stays within tolerance limits of —.0000/ +.0015 inch.



PRODUCTION PERSONNEL check wide variety of tubing used by Harbison-Fischer to produce "Best Pumps in the Oil Patch" for world-wide market.

reading) to overcome distortion caused by working of the tubing.

For installations where hard pumping and hard wear are factors, Harbison-Fischer heat-treats high carbon barrel tubing by an exclusive electronic process. The process penetrates the I. D. a predetermined depth to produce exceptional wearing quality, while permitting the O. D. to remain ductile and shock resistant.

Applications such as Harbison-Fischer's are typical of the uses to which Pittsburgh Seamless Tubing is put. There are thousands of them.

If you manufacture cylindrical products or parts requiring close tolerance, smooth surface or specific physical properties, Pittsburgh Seamless Mechanical Tubing can save you time and processing costs. Contact one of the district offices or distributors listed at the right. A Pittsburgh Steel representative will show you how.

Pittsburgh Seamless Distributors

Baker Steel & Tube Company
Los Angeles, California

Chicago Tube & Iron Company
Chicago, Illinois

Cleveland Tool & Supply Co.
Cleveland, Ohio

Drummond, McCall & Co., Ltd.
Montreal, Quebec, Canada

Edgcomb Steel Company
Philadelphia, Pennsylvania

Gilmore Steel Corporation
San Francisco, California

Earle M. Jorgensen Co.

Kilsby-Tubesupply, Division of
Republic Supply Co.
of California
Los Angeles, California

Mapes & Sprowl Steel Co.
Union, New Jersey

Metal Goods Corporation
St. Louis, Missouri

Miller Steel Company, Inc.
Hillside, New Jersey

A. B. Murray Co., Inc.
Elizabeth, New Jersey

C. A. Russell, Inc.
Houston, Texas

Ryerson, Joseph T. & Son, Inc.

Solar Steel Corporation
Cleveland, Ohio

Standard Tube Sales Corp.
Brooklyn, New York

Steel Sales Corporation
Chicago, Illinois

Tubular Sales
Detroit, Michigan

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Boston, Massachusetts

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Dayton, Ohio

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ELECTRIC ALLOY STEEL ROLLS

Greater sub-surface strength lets Birdsboro rolls take higher mechanical stress, increases resistance to thermal shock. You get higher output per roll plus added production protection. Your Birdsboro representative will be happy to give you the complete story. *Sales Department, Engineering Department and Mfg. Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.

R31-60

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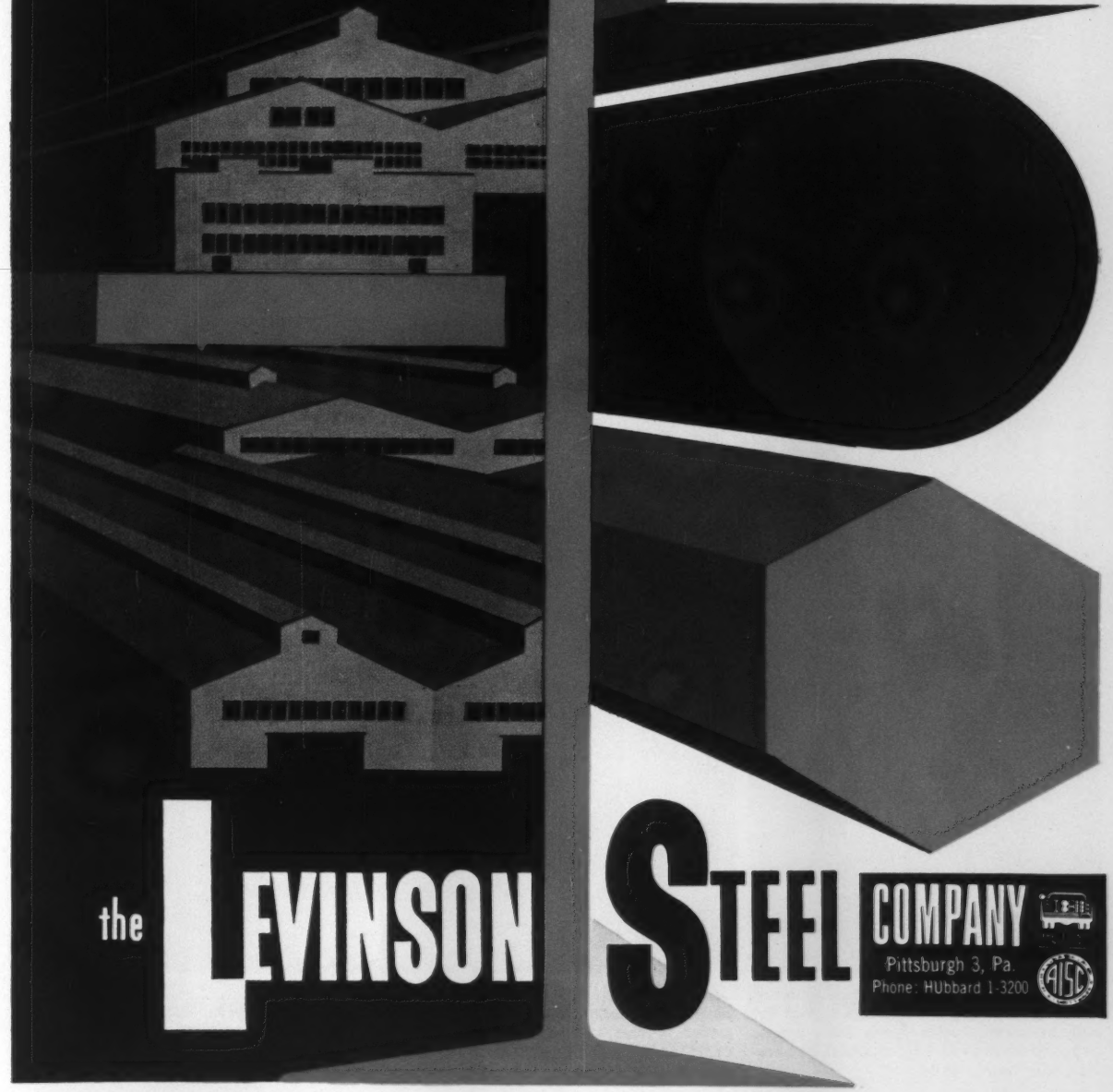
CORPORATION

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL

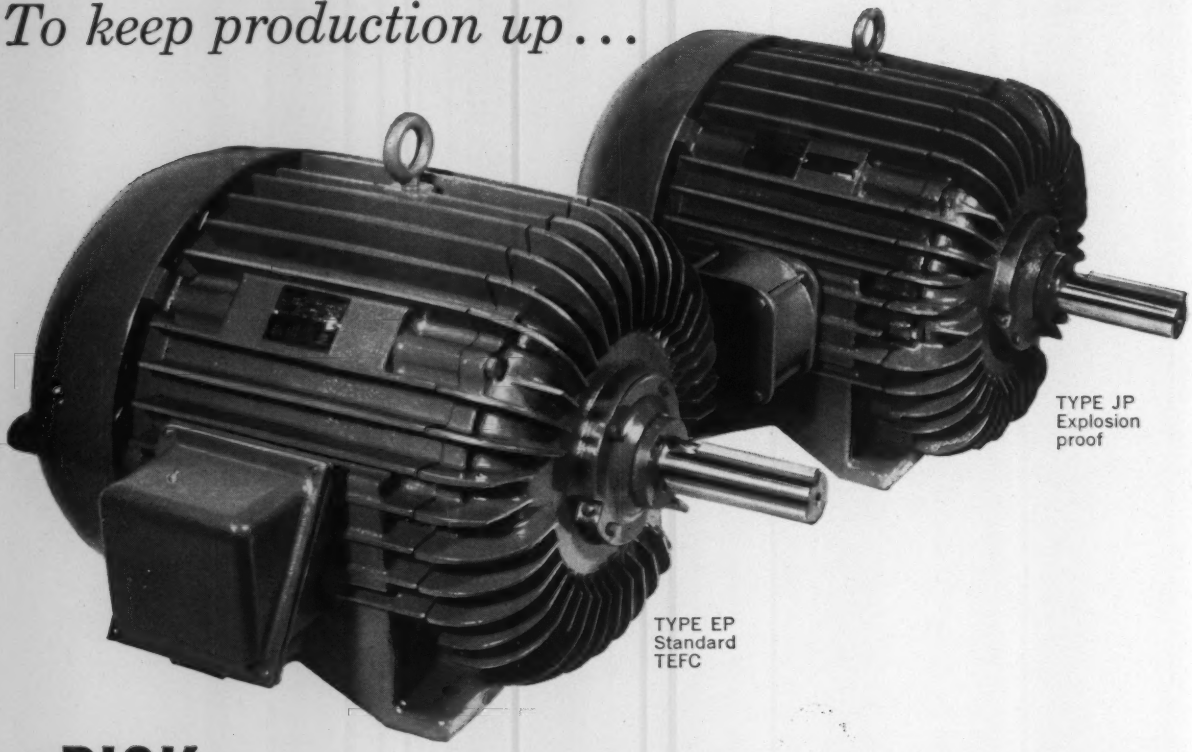
Dealers in American made steel
for over half a century

WHEN YOU NEED STEEL CUT TO SIZE OR FULLY FABRICATED YOU CAN DEPEND ON LEVINSON. THOUSANDS OF COMPANIES HAVE LEARNED TO RELY ON LEVINSON FOR 58 YEARS WITH FULL ASSURANCE THAT THEIR STEEL WILL BE DELIVERED AS SPECIFIED AND ON TIME.



the LEVINSON STEEL COMPANY
Pittsburgh 3, Pa.
Phone: HUbbard 1-3200
AISC

To keep production up...



PICK FROM THIS PROTECTED PAIR...

Here's a power-packed pair of Wagner® totally-enclosed fan-cooled motors —Type EP, standard, protected against damage from dust, abrasive, fumes, steel chips or filings; and Type JP, explosion-proof, for safe use in specified hazardous locations.

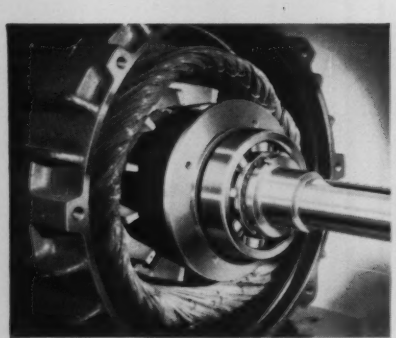
They'll keep your production rates up, delivering full rated horsepower under the toughest conditions . . . staying on the job with dependable, continuous service that means peak output. They're the perfect pick, for individual machines or for automated lines.

In the design illustrated, these motors are built in ratings through 100 hp in NEMA frame sizes 182-445U. Let your Wagner Sales Engineer show you how this protected pair (or larger Wagner enclosed motors through 500 hp) gets the job done. Call him, or write us for Bulletin MU-224.

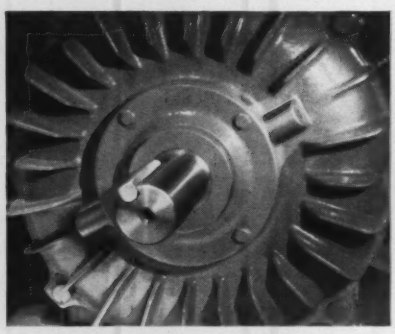
Wagner Electric Corporation

6403 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI

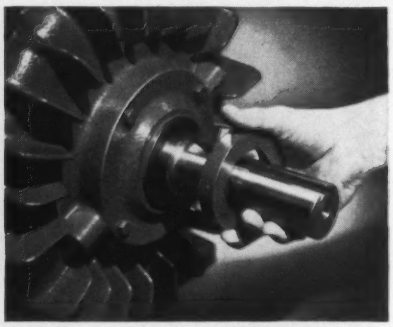
WM60-19



HEAVY-DUTY BALL BEARINGS... The ball bearings used in these motors are of the highest quality, with more than ample capacity to provide long, troublefree service under heavy loads.



BEARINGS CAN BE RELUBRICATED... Factory lubrication will last for many years under normal service, but openings are provided to permit relubrication that adds years to motor life under severe conditions.



SECURELY SEALED FOR LOW MAINTENANCE... Both ends of these motors have running shaft seals to keep the bearings clean. Bearing housings are effectively sealed to prevent escape of grease.

Leadership in Steel!

FOR PARTNERSHIP
IN WORLD PROGRESS:

Quality
steel products bearing the **YAWATA** insignia are exported throughout the world, participating in your industrial promotion and contributing to the incessant progress of **mankind.**

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Cable Address: **YAWATASTEEL TOKYO**
American Office: 375 Park Avenue, New York 22, N.Y., U.S.A.
Cable Address: **YAWATAISCO NEWYORK**
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We're Packaging* Partners

and packaging partnership pays off

**Pre-packaged screws and instructions*

Here are the advantages of pre-packaging for The Stanley Works . . . by Screw and Bolt Corporation of America . . .

- many hours of packaging time saved
- quick identification of companion product
- complete instructions in envelope
- product packaging speed increased
- customer receives full count of all accessories
- product appearance improved
- greater dealer acceptance of STANLEY hardware

Yes . . . Stanley enjoys all these advantages . . . and at a cost much less than packaging in their own shop.

Screw and Bolt has a packaging partnership plan for you:

- your identification maintained
- your choice of Screw and Bolt fasteners
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- delivery when you want it . . . where you want it

Get all the details on how Screw and Bolt's packaging partnership plan can work for you. Write "Packaging Service, Screw and Bolt Corporation of America, Southington, Connecticut." You'll be glad you did.

VMA 7616

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AMERICA'S MOST COMPLETE LINE OF INDUSTRIAL FASTENERS

LIMA *35-ton capacity* Truck Crane unloads German freighter *Leada* . . . at Toledo Marine Terminal after sailing the St. Lawrence Seaway.

Lima Truck Cranes are versatile, highly mobile, top-quality machines designed and built for precision lifts. Experience has proven that they can be depended upon to outperform other makes of cranes year after year. And maintenance requirements are lower because Limas are better built.

For example, all parts subjected to extra wear are induction hardened; extra-strong and rigid rotating base turns on tapered conical rollers between twin roller paths; power take-off and swing gears are enclosed, running in oil; special steel and anti-friction bearings are used throughout.

Limas can be stripped down with speed and ease for reduced-weight highway travel at automotive speeds from place to place. Lima accepts undivided responsibility because it manufactures the entire unit, including the carrier.

Optional attachments permit it to be used with shovel, dragline, clamshell or pullshovel for digging or handling bulk materials or with magnet for metals.

There's a time and money-saving Lima ideally suited for every industrial application from unloading ocean freighters to recovering scrap metal. Truck cranes to 80 tons; wagon cranes to 75 tons; crawlers to 140 tons. Ask your nearby Lima distributor for facts and figures now. Or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio

BALDWIN · LIMA · HAMILTON

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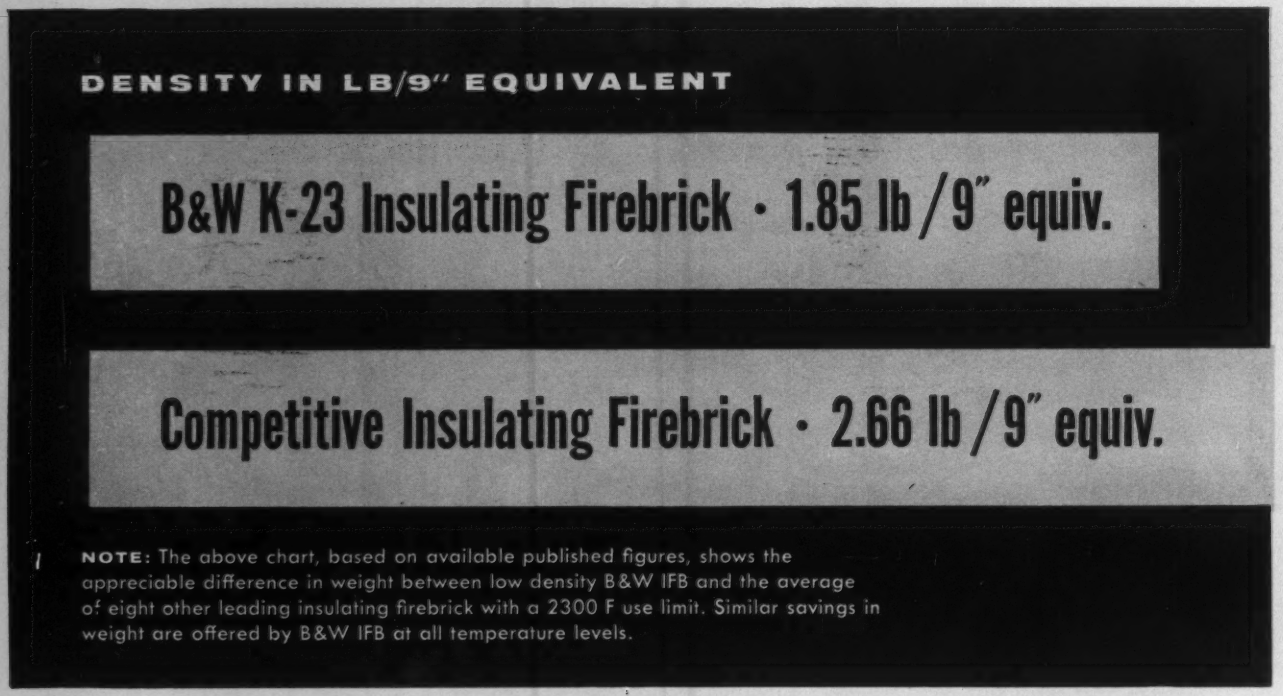
Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment

Another *plus* of Lightweight B&W Insulating Firebrick

LOWER DENSITY means


DENSITY IN LB/9" EQUIVALENT
B&W K-23 Insulating Firebrick · 1.85 lb/9" equiv.
Competitive Insulating Firebrick · 2.66 lb/9" equiv.
NOTE: The above chart, based on available published figures, shows the appreciable difference in weight between low density B&W IFB and the average of eight other leading insulating firebrick with a 2300 F use limit. Similar savings in weight are offered by B&W IFB at all temperature levels.

All insulating firebrick are not the same. Published figures show wide variations in *all* of the important properties among the leading brands of IFB.

Take density. This important property, related to the porosity and the light weight of the brick, affects furnace weight, construction costs, fuel costs, and temperature control. Densities range from a B&W Insulating Firebrick low of 1.85 to a high of 2.80 per 9 inch brick for a competitive Insulating Firebrick—*approximately a 35% difference in dead weight and insulating efficiency.*

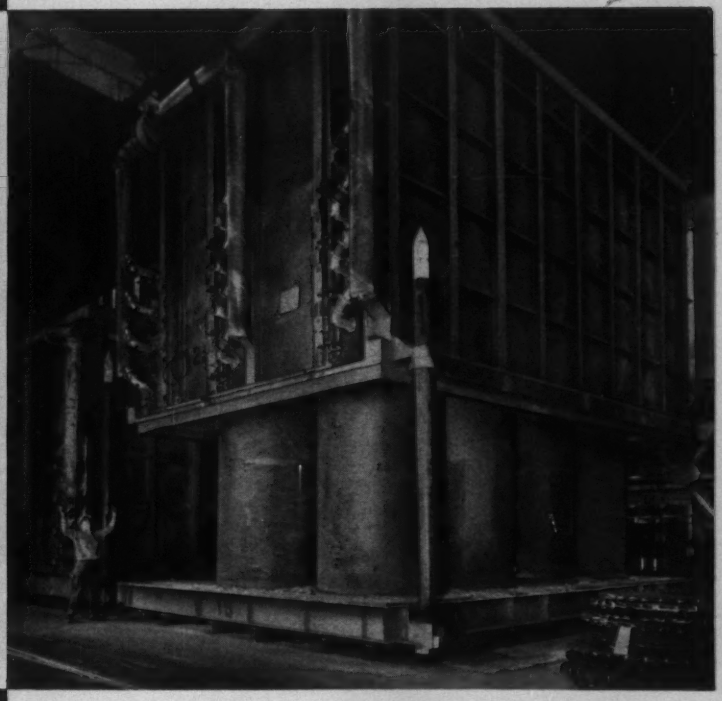
You are paying for *insulating* firebrick . . . make sure you get *all* the benefits. B&W—the originator of IFB—manufactures a full line of IFB with an experience-proved balance of light weight, high insulating value, high strength and long life.

For complete information on B&W Insulating Firebrick, write for Catalog R-2-H to The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, N. Y.

NUMBER 2 OF A SERIES

LESS FURNACE WEIGHT

the payoff



9 TONS LESS WEIGHT to heat and lift in this hood-type, 8 stack annealing furnace. Lined with B&W IFB at 1.85 lb per 9" straight, the refractory lining of this furnace weighs 37,000 lb as compared to 55,200 lb for average *weight competitive IFB*. 33% less weight to heat and lift when you specify B&W IFB. This is just one of many proofs in our files that "there is an important difference in insulating firebrick."

B&W

THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

R-859

Your 2 factors in steel costs...

Steel is a low-cost material. But when you tie up your money in it, store it, insure it, pay taxes on it, buy equipment to handle it, cut and burn it—you often add unnecessarily to this low cost. And the big question is whether you or your nearby steel service center should perform these functions. The wisest thing to do is to find out.

Each steel user's case is different. Your steel service center will be glad to help you determine the most economical way to buy and use steel by considering all your costs of possession, such as:

Cost of capital:	Cost of operation:	Other costs:
Inventory	Space	Obsolescence
Space	Materials handling	Insurance
Equipment	Cutting & burning	Taxes
	Scrap & wastage	Accounting

Call your steel service center, or write for free booklet, "What's Your Real Cost of Possession for Steel?"

STEEL SERVICE CENTER INSTITUTE

...YOUR STEEL SERVICE CENTER

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MAJOR REASONS FOR SPECIFYING NATIONAL ELECTRODES...

QUALITY · SERVICE · DELIVERY FACILITIES

RESEARCH & DEVELOPMENT

PLANTS

NATIONAL CARBON has electrode-producing facilities unsurpassed the world over!

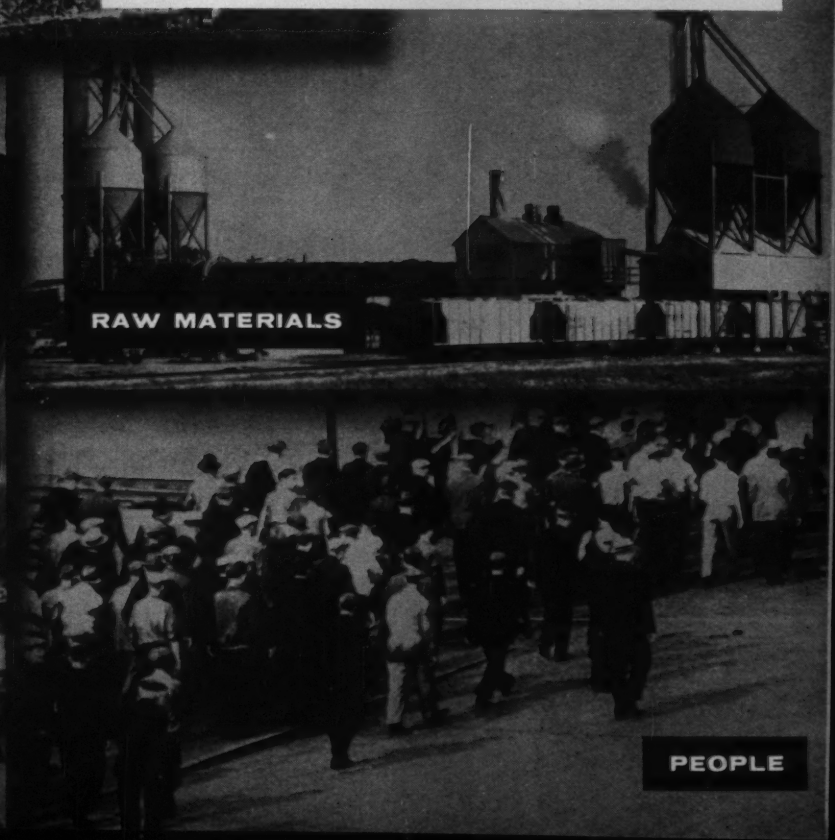
When you specify "National" electrodes you can be sure that National Carbon Company has the facilities — or to state it another way, the combination of ingredients — to provide you with a quality product for use when you want it. What are these ingredients?

In addition to abundant supplies of raw materials, NATIONAL CARBON plants are staffed with personnel thoroughly experienced in electrode production techniques. They have at their disposal the latest equipment available to help them produce quality products that are unsurpassed in the industry today. This combination of raw materials, experienced personnel and modern equipment is backed by extensive research and development programs, which means NATIONAL CARBON can supply your every electrode need . . . no matter how large or small. For details, contact National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, New York. In Canada: Union Carbide Canada Limited, Toronto.

"National" and "Union Carbide" are registered trade-marks for products of

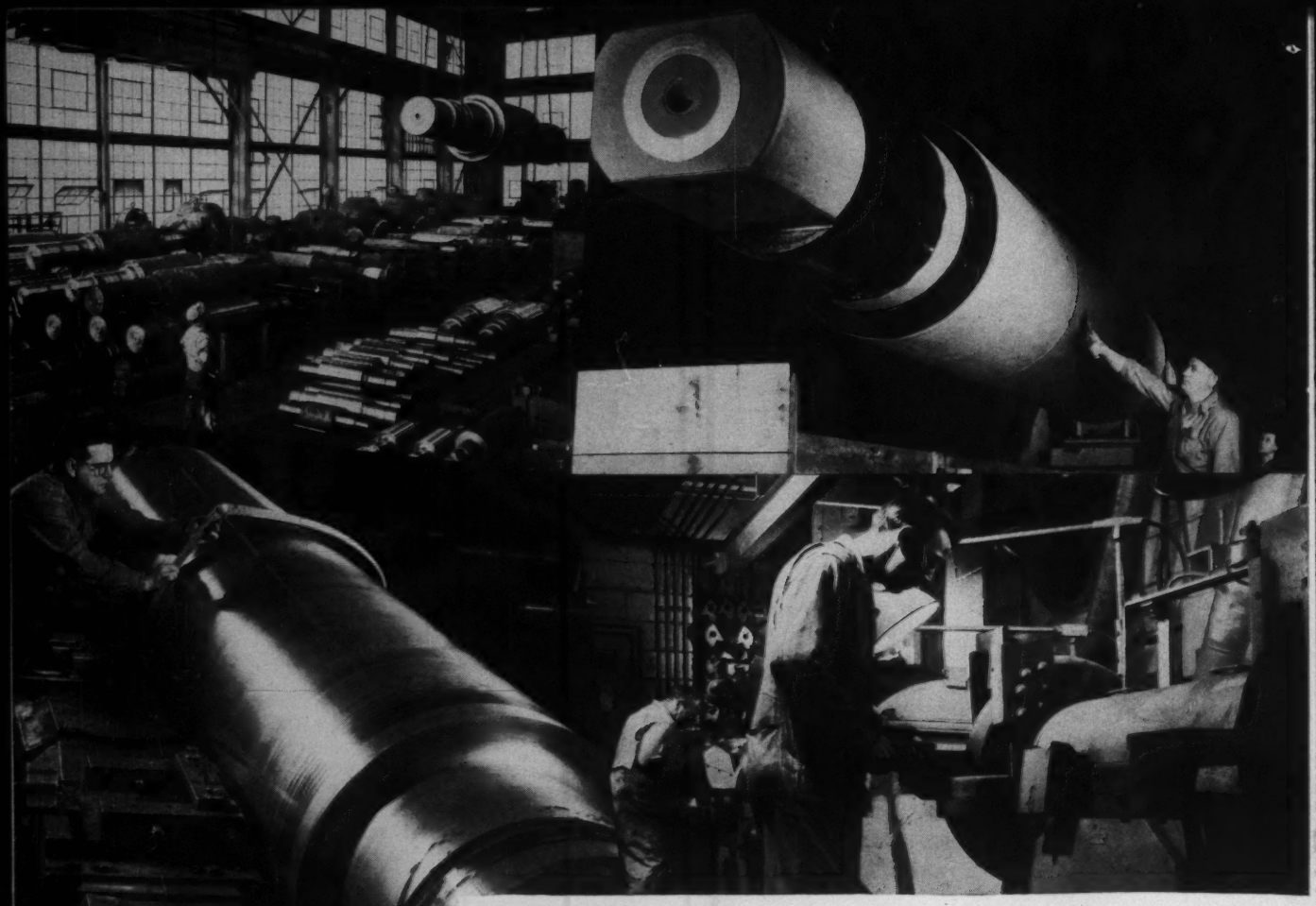
NATIONAL CARBON COMPANY UNION CARBIDE

EQUIPMENT



RAW MATERIALS

PEOPLE



EXPERIENCE—Alertness to individual operating requirements, coupled with a broad knowledge of rolling practices, is a major part of every Blaw-Knox Roll Engineer's experience.

Behind him is an organization with more than a century's experience in the development and manufacture of rolls.

This experience is your assurance of rolls having the properties, dimensions, and finish for maximum service.

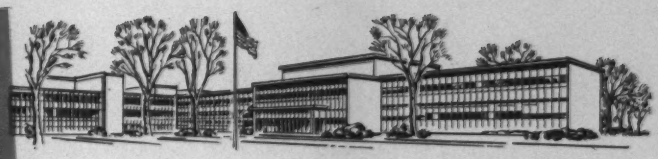
Blaw-Knox Roll Engineers welcome the opportunity to join with you in selecting and applying the rolls best suited to your operating conditions.

Blaw-Knox Company, Foundry and Mill Machinery Division, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

BLAW-KNOX

ROLLS

HAYNES ALLOYS



RESEARCH REPORTS

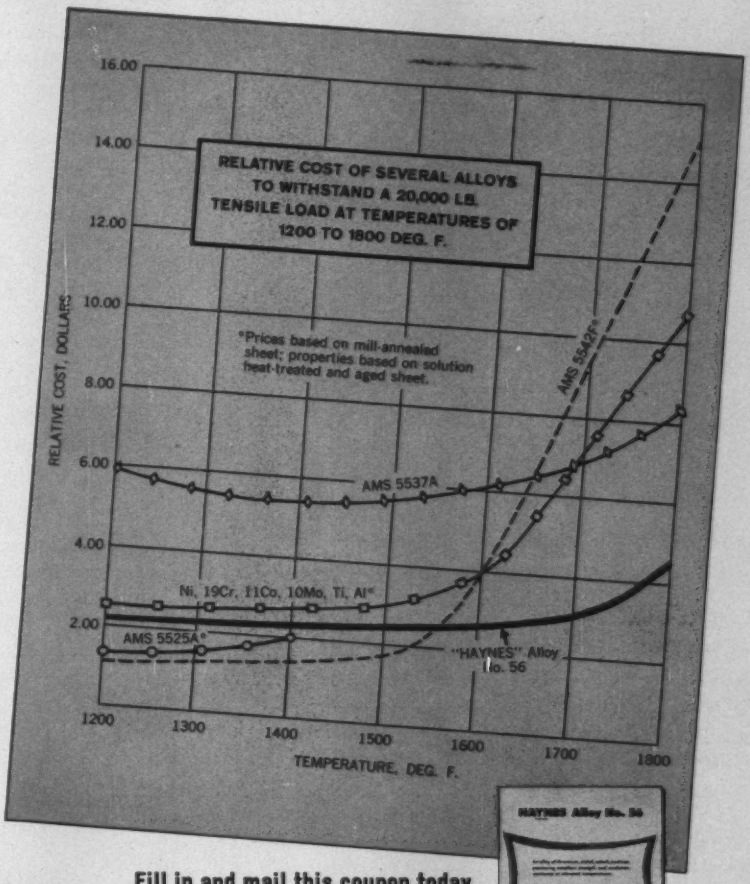
New High-Temperature Alloy Improves Cost-To-Strength Ratio

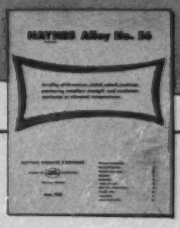
Excellent strength and oxidation resistance in the 1200 to 2000 deg. F. range are among the features of HAYNES Alloy No. 56—a new high-temperature alloy developed by Haynes Stellite Company.

A sampling of its cost advantages at a given tensile load, compared with other high-temperature alloys in the graph at the right, is well worth your study.

Alloy No. 56 can be readily hot-worked and formed. It is easy to heat treat. It comes in the form of sheet, plate, bar, wire, and coated welding electrodes, and can be furnished as sand-, investment-, and resin shell-mold castings. The coupon below will bring you a wealth of technical data.

The new iron-base alloy contains nickel, cobalt, chromium, and molybdenum. It has high strength at temperatures up to 1500 deg. F and maintains useful strength at temperatures as high as 2000 deg. F.





Fill in and mail this coupon today

Haynes Stellite Company, Dept. 21
270 Park Avenue, New York 17, N.Y.

Please mail me the free, 16-page properties-data booklet on the new HAYNES Alloy No. 56.

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HAYNES ALLOYS

HAYNES STELLITE COMPANY

Division of Union Carbide Corporation
Kokomo, Indiana

UNION CARBIDE

Haynes" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

Another new UNIT-COLES crane for Major Electrical Manufacturer

Gasoline-Electric Mobile Crane combines unequalled precision, safety and mobility

This UNIT-COLES is assigned to moving raw and in-process material from storage areas at G.E.'s plant. Here, the 12-ton mobile crane with 25-ft. boom is handling rotor shafts to be used in large DC motors. The load weighs 15,700 lbs.

A new UNIT-COLES 12-ton gasoline-electric mobile crane was purchased recently by General Electric Company's Large Motor and Generator Department in Schenectady, N. Y. to move raw and in-process material. Four other UNIT-COLES Cranes are used for materials handling by various departments of the company.

Precise control and safety, unequalled by ordinary cranes, are two important benefits a UNIT-COLES brings to yard handling. That's because there are individual electric motors for independent or combination control of *every* function. Electric power and control of load-hoist and boom-hoist means an unbeatable combination for pin-point accuracy in spotting loads. An independent load-hoist power source automatically adjusts all speeds to the load; the crane operator can raise or lower a light load quickly—or ease a heavy load into place so carefully movement is barely visible. The independent swing and travel power sources allow an operator to navigate narrow aisles with ease and speed.

Utmost safety is assured by a positive-action Safe Load Controller with a "stop and hold" function that automatically prevents overloading. Self-resetting limit switches prohibit dangerous over-travel of load and boom. These outstanding safety features together with "fail-safe" *automatic braking* and dead man control on all crane motions contribute to make a UNIT-COLES the *world's safest crane.*

Other important UNIT-COLES advantages are: steering that is "left-for-left" and "right-for-right" whether the boom is over the front or rear of the chassis; unique cantilever boom that allows operation close to stacked material, requiring less aisle room; simplicity of operation — an inexperienced operator learns in a matter of minutes; and low maintenance costs — hundreds of major wearing parts required on other cranes, including clutches and hook rollers, are eliminated.

UNIT-COLES mobile and truck cranes are available in capacities ranging from 5 to 55 tons. Write today for details on the complete line and the name of your nearest dealer.

UNIT-COLES

UNIT CRANE & SHOVEL CORP.
6705 W. Burnham Street
Milwaukee 19, Wisconsin

ANOTHER NORTON PRODUCT

The Reason for Resin

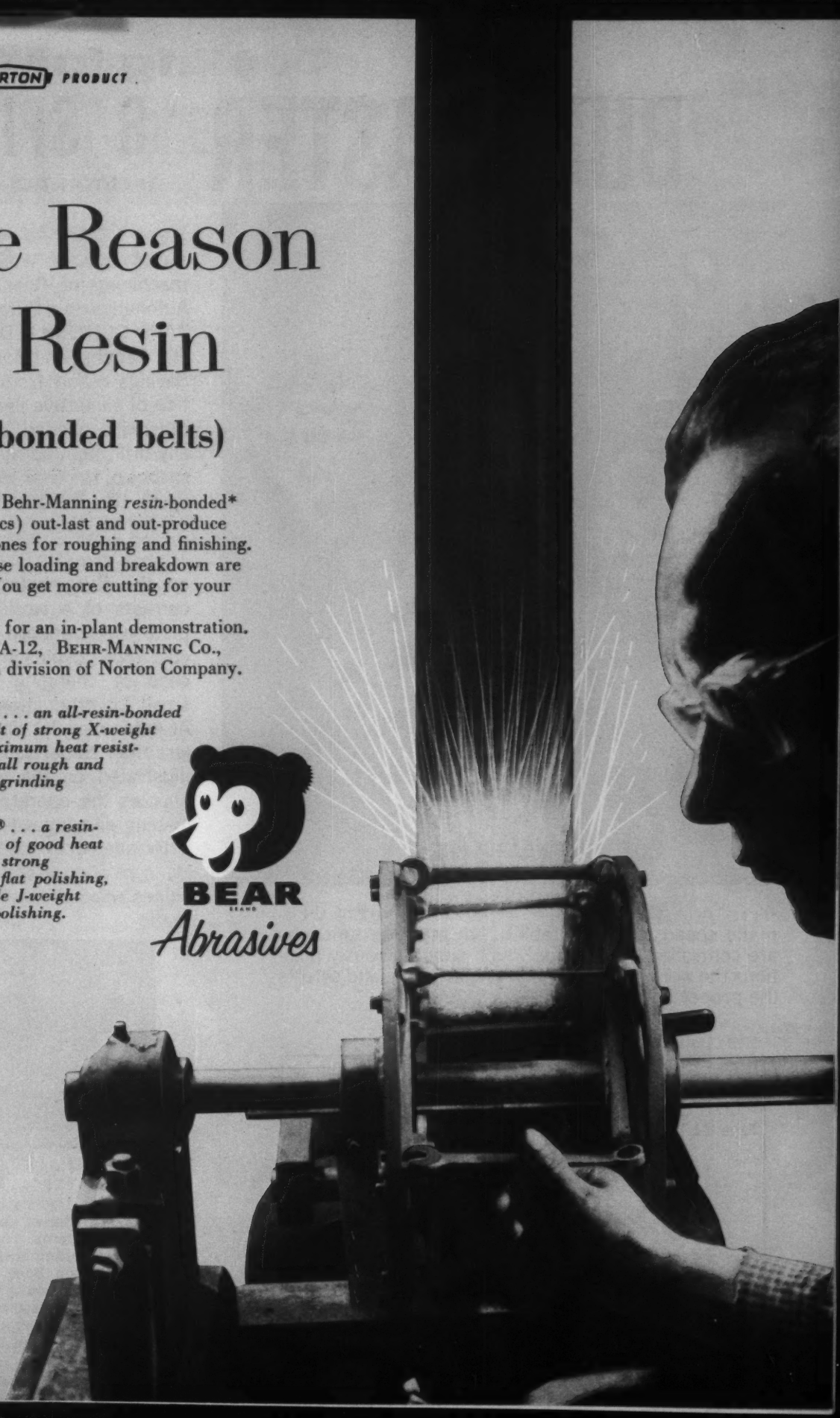
(resin-bonded belts)

Simply this: Behr-Manning *resin*-bonded* belts (and discs) out-last and out-produce glue-bonded ones for roughing and finishing. Why? Because loading and breakdown are minimized. You get more cutting for your belt dollar.
Prove it. Ask for an in-plant demonstration. Write Dept. IA-12, BEHR-MANNING CO., Troy, N. Y., a division of Norton Company.

*RESINALL® . . . *an all-resin-bonded aggressive belt of strong X-weight cloth, for maximum heat resistance in most all rough and intermediate grinding operations.*

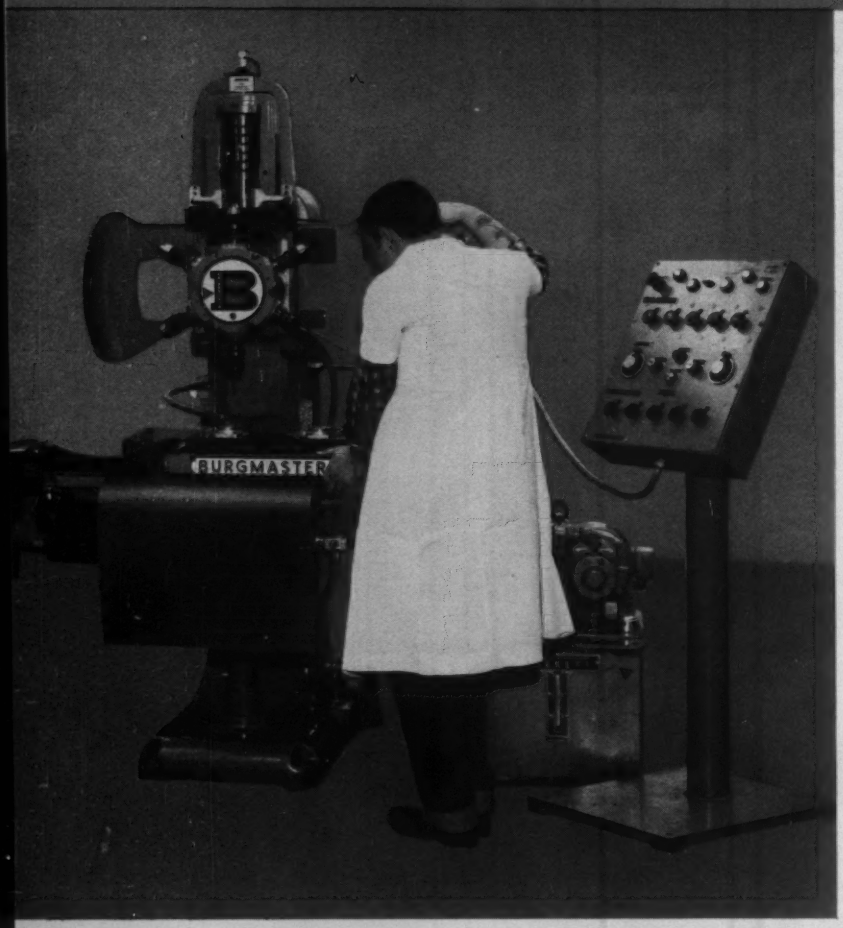
*RESINIZED® . . . *a resin-over-glue belt of good heat resistance, in strong X-weight for flat polishing, and in flexible J-weight for contour polishing.*

BEAR BRAND *Abrasives*



Tooling for Gear BURGMASTER 6 SPINDLE

At AUTONETICS, a Division of



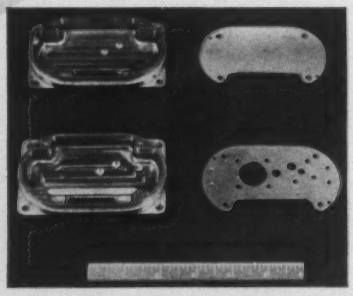
Tool costs are reduced 75% in the machining of Gear Housings at Autonetics on a Burgmaster 2BHT TAPE CONTROLLED Turret Drilling, Tapping and Boring Machine. Savings result from the elimination of expensive jigs and fixtures otherwise needed to conventionally drill, tap and mill three basic shapes of the Gear Housings, each up to 13 different hole patterns.

The present inexpensive setup on the Burgmaster Turret Drill consists of a work-holding subplate and standard clamps. Low cost tooling, plus the speed and ease of changing jobs, makes small lot production economical. At Autonetics, lot sizes are usually less than 25 parts. The twin setup illustrated on the Gear Housing enables the operator to perform loading and unloading operations while one part is being machined. He can also attend several machines since all machining is automatic.

The Machine Sets the Pace at automatic speed and repeatability. All machine functions are controlled by the tape which simultaneously positions the work on the X-Y axis at 150"/min. and selects the proper spindle.

SEQUENCE OF OPERATIONS

	Spindle No.	Oper'n or Tool (Dia.)	Speed	Depth	Number of Holes
Tape #1	1	#2 C'Drill	3000		All
	2	#1 C'Drill	2000		All
	3	1/8 Drill	1300	3/16 thru	7
	4	#43 Drill	3000	3/16 thru	2
	5	#50 Drill	2000	3/16 thru	2
	6	2-56 Tap	450	thru 3/16	2
Tape #2	1	#37 Drill	3000	3/16 thru	1
	2	1/4 End Mill	2000	.922	2
	3	4-40 Tap	450	thru 3/16	2
	4	3/16 Drill	3000	3/16 thru	1
	5	1/4 Drill	2000	3/16 thru	1
	6	13/16 Drill	450	3/16 thru	1



GEAR HOUSINGS BEFORE AND AFTER MACHINING
Autonetics produce these parts in three cast shapes, each with up to 13 hole patterns. The Insert Plate (right) is assembled on top the Gear Housing Base prior to machining, with two dowel pins providing close assembly register. 57 machining operations are performed on 17 holes to close tolerances without jigs.

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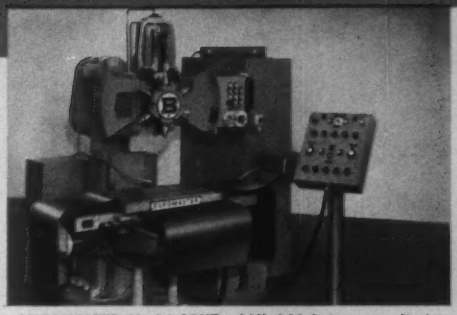
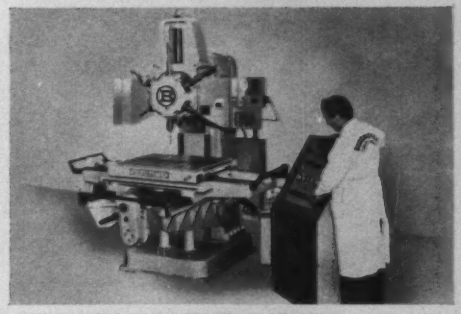
. . . "A considerable amount of additional savings results from reduction in inspection time. It is our practice to inspect the first piece, and have the inspector sign the tape which generally indicates acceptance of future lots in view of the excellent repeatability."

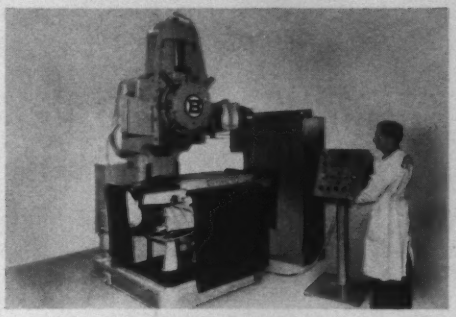
Write for Literature describing the complete line of Burgmaster 6 and 8 Spindle Tape Controlled Turret Drilling Machines. Forty minute 16mm sound film showing all Burgmaster Turret Drills in operation is available without charge.



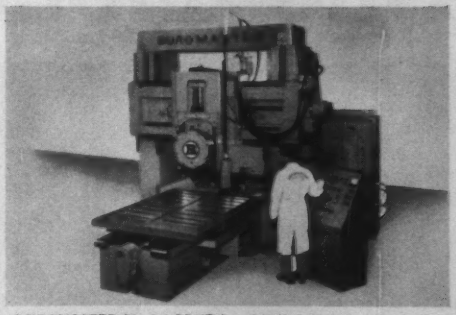
BURGMASTER Model 2BHT—¾" drill & tap capacity in steel. Positioning Table sizes: 10"x18" & 15"x26".



BURGMASTER Model 25AHT—1¼" drill & tap capacity in steel. Positioning Table sizes: 15"x26" & 20"x30"



BURGMASTER Model 3BHT—1½" drill and tap capacity in steel. Positioning Table sizes: 20"x30" & 30"x45".



BURGMASTER Model 3BHT-B—1¾" drill & tap capacity in steel. Table Travel 60 x48

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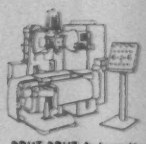
2B Manual Power Index ⅜" Capacity

2BR Ram Type Radial Drill ¾" Capacity

2BH Automatic Hydraulic ¾" Capacity

3BH Automatic Hydraulic 1½" Capacity

25AH Automatic Tape Controlled 1¼" Capacity



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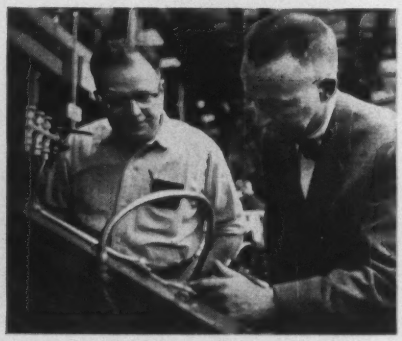

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EUROPEAN STEEL MILLS ARE PUSHING HARD to match American quality on cold-rolled sheets. This is the view of top steel industry metallurgists just back from a European tour. They feel this country still has an edge. By the end of 1962, say the experts, Europe will have enough sheet capacity to meet its own needs and have 30 pct left over for export.

PURCHASING AGENTS ARE "COASTING AND HOPING." This is the word from the November survey of the National Association of Purchasing Agents. A whopping 84 pct of the survey committee members report committing their production materials needs on a 60-day-or-less basis. They also report prices still drifting downward.

LEADERSHIP IN THE MARKET PLACE will be the formula for better business by individual companies in 1961, according to Ralph J. Cordiner, GE board chairman. He says the course of the economy will be determined not by records of statisticians, but by, "the quality of business leadership in meeting the realities of the market place."

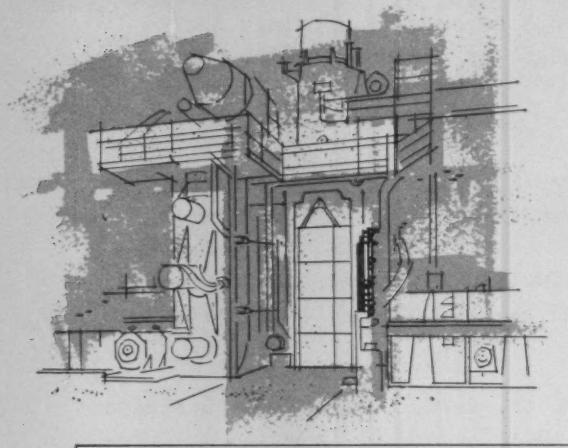
LOW SCRAP PRICES SLOW PROGRESS IN DIRECT REDUCTION OF ORE, says one consultant specializing in steelmaking costs. He claims that scrap metal prices have now stabilized at a point where the immediate push for direct reduction is rapidly losing steam.

INVENTORIES SHIFT TO MEET FAST DELIVERY NEEDS. A Commerce Dept. analysis of the $400 million drop in manufacturing inventories in October shows that raw material and semi-finished stocks were cut, while finished goods stocks were increased.

LOOK FOR FURTHER DIVERSIFICATION BY AIRCRAFT COMPANIES. Diversification is the key to survival in this industry. Earnings of the 12 major airframe producers declined 63 pct between 1955 and 1959. And their big customers, the domestic air trunklines, lost $7 million in the first six months of 1960. New products and new markets will make aircraft companies new customers.

LONG-TERM LEASE OF METALWORKING EQUIPMENT is now available. A Chicago leasing company now offers lease terms as long as 6 to 12 years. Companies with net worth as little as $1 million are eligible for the long-term leases for as little as $25,000 worth of equipment. The plan features quarterly payments.

ON INLAND STEEL'S 45" x 90" SLABBING MILL HEAVY DUTY FARVAL CENTRALIZED LUBRICATING SYSTEMS EASILY ADAPT TO BULK HANDLING



On Inland Steel's high production slabbing mill (shown at left) 1,023 bearings are served by 12 Farval Centralized Lubricating Systems. A single low pressure supply line connects each automatic central station reservoir to the bulk storage tanks—insures a constant supply of lubricant direct to bearings through individually operated Farval Systems.

On typical bulk handling installations (shown below), Farval reservoirs provide a reserve supply of lubricant for each system at all times. Manual or automatic controls can be provided for filling of reservoirs from the main supply line. System flexibility is assured by these Farval-engineered features—rugged double plunger units, automatic system timing controls and individual adjustable measuring valves with visual indicators.

With Farval on the job, indication is based on system performance . . . not on system failure.

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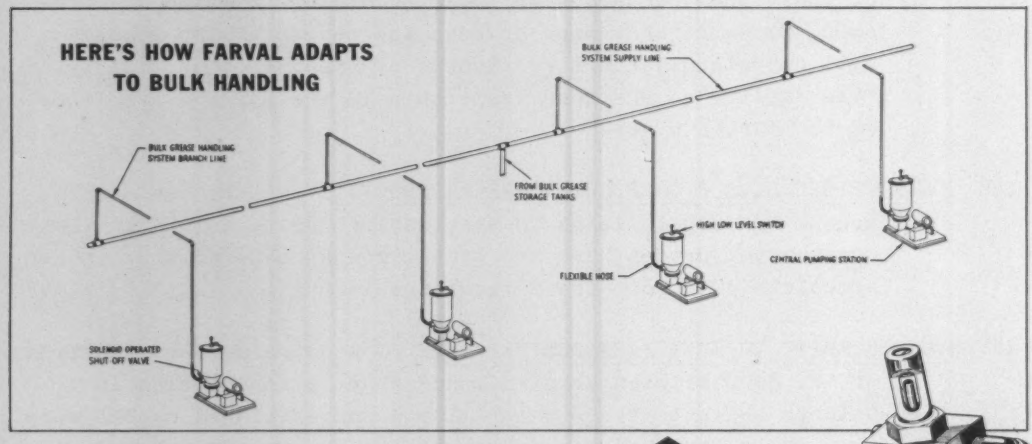
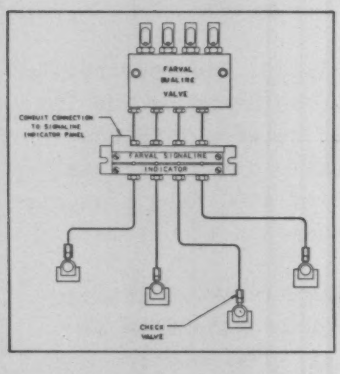
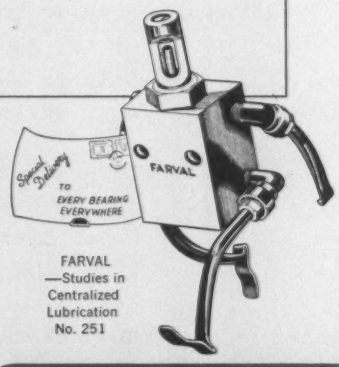

HERE'S HOW FARVAL ADAPTS TO BULK HANDLING
BULK GREASE HANDLING SYSTEM SUPPLY LINE
BULK GREASE HANDLING SYSTEM BRANCH LINE
FROM BULK GREASE STORAGE TANKS
HIGH LOW LEVEL SWITCH
CENTRAL PUMPING STATION
FLEXIBLE HOSE
SOLENOID OPERATED SHUT-OFF VALVE



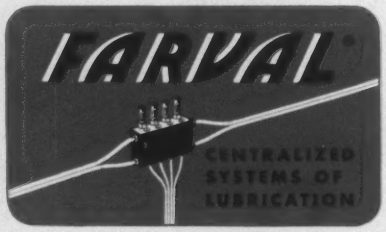
From bulk tanks to bearings—whether on a new installation or existing one—independently operated Farval Centralized Lubricating Systems can be easily tied into a common source of lubricant supply.

From bulk tanks, lubricant moves under low pressure through the main supply line to Farval reservoirs. Thus, use of this method avoids the dangers created in subjecting a large volume of lubricant to constant high pressure.



FARVAL —Studies in Centralized Lubrication No. 251

New Signaline Indicator—exclusive only with Farval—guarantees positive remote indication of broken or plugged discharge lines on critical bearings.



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WHITE-COLLAR PICKETS: More than 8,000 salaried employees struck Chrysler before current agreement.

Unions Rebuffed in White-Collar Drive; Gird for New Battles

Office, technical and professional workers show little interest in unions. But renewed union efforts, changing times, may turn tide.

Practice of companies in sharing union gains with white-collars thwarts unions.—

By J. D. Baxter

■ White-collar unionism is making little headway. It is even losing some ground.

This fact is a thorn in the side of union leaders. It is a depressant on the entire union movement.

Unions have met severe setbacks in white-collar unionization. But managements can expect mounting and varied attacks by unions to capture white-collarites. Union drives are now being intensified.

Recent national election results, coupled with rough economic weather, may ripen into a situation favorable to organization of salaried workers. And many labor leaders feel that the "automation" monster may stampede office and clerical workers into the union fold.

Bright Hopes, Dark Facts—While some signs may look bright for white-collar unionization, recent facts look dark.

White-collar workers are the fastest growing segment of the labor force. And they remain the largest group of workers outside the U. S. trade union movement. Only an estimated 12 pct of the 15 million white-collar workers are organized.

In fact, union rolls show a falling trend in white-collar members. In 1956, 2,463,000 white-collar workers were unionized. In 1958, this number had dropped to 2,148,000, down 279,000 for an 11 pct decline. Figures are not yet available for 1959-60, but U. S. Labor Dept. officials expect little change in these figures for the last two years.

Walter P. Reuther, United Automobile Workers president, and president of the Industrial Union Dept. of AFL-CIO, in 1957 bluntly told a conference of the AFL-CIO: "The white-collar workers need the union and the union needs the white-collar workers."

White-Collar Jump—There are some hard facts behind Mr. Reuth-

er's concern with the union "need" for white-collar workers.

In the past 50 years, industrial production in the U. S. has increased by more than 600 pct. During the same period, the number of factory workers increased by 80 pct. Office workers increased 450 pct.

Since 1947, between three and four of every six additions to the manufacturing work force have been in white-collar jobs.

By union admission, white-collar workers will continue to outstrip blue-collar workers in numbers. According to S. H. Ruttenberg, AFL-CIO director of research, the shift in employment trends, "probably will result in even greater future white-collar employment."

Blue-Collar Decline—The United Steelworkers has stated that, "Trends indicate a future of severe reduction in the production and maintenance work forces. There can, therefore, be no doubt as to the urgency of gearing our drive to meet this (white-collar unionization) challenge."

The organizing drive has not been a concerted one. Industrial unions such as the UAW (60,000 white-collar members), and the USW (45,000 white-collar members) are actively driving for white-collar workers. So is the American Federation of Technical Engineers (AFTE) with 12,000 members. This is also an AFL-CIO affiliate.

And there are independent salaried worker unions such as the National Federation of Salaried Unions (12,000 members), and the Engineers and Scientists of America (42,000 members). Company white-collar unions are also in the race. The largest union in this latter group is the Federation of Westinghouse Independent Salaried Unions (15,000 members).

Industrial Unions — Industrial unions say they have the big money needed to set up a sustained white-collar organizing program. They say they alone have the organizational resources to do the job—research departments, legal departments, etc. Also, these unions say they have the hard-core organizing skill and experience needed to do the job. They argue that they already have the blue-collar workers organized and they know intimately industry and company problems.

Salary Unions—"Pure" unions—white-collar workers only—say they have the answer, not industrial unions. They say there is a psychological barrier in the way of white-collar workers joining unions that are blue-collar-oriented.

Purist white-collar unions also contend industrial unions miss the organizing boat by stressing economic issues above all else. These unions feel white-collarites are more interested in fair job classifications, security, and similar issues—at least, in first organizing.

Also, these unions claim they are less prone to strike. White-collar people don't like strikes, they say.

Management Interest — But the implication to managements is clear. They will continue to be hammered by the one-two punch in white-collar union organizing.

Many unionists point the finger at automation when asked about their lack of headway with salaried

Factors at Work in Drives for Salaried Workers

PRO-White-Collar Unions

Unions Have Become Socially Acceptable. Unions are often important in political and community affairs; union leaders are on boards of college and civic groups.

White-Collar Workers Now Have More Personal Contact With Union Members. Both frequently live in the same communities and sense social equality.

Differences In Income Between Office Workers and Plant Workers Have Lessened. Many traditional salary worker fringe benefits are now available to the wage earner.

Office Automation Causes "Job Security" Fears. Many believe the fear of displacement by machines will make office workers turn to unionization.

Unions Now Present Unionism In Terms That Appeal to Salaried Workers. Example: The grievance committee is often called the office relations committee. Some unions set up career workshops.

CON-White-Collar Unions

Smaller Employing Units. Many white-collar workers are in service industries. With smaller units than manufacturing, service now employs 33.4 million; production, 27.2 million.

High Percentage of Women White-Collar Workers. Two-thirds of all clerical, 40 pct of sales, and 40 pct of professional workers are women.

Traditional Pride of White-Collar "Status." Salaried workers feel closer to management.

Company Practices. Most white-collar workers now automatically share in union gains.

Professional Organization Resistance. Many professional interest groups consider unionization not amenable to professional standing.

Divided Union Drives. Industrial unions, white-collar-only unions, and company unions all vie for office and technical employees.

workers. But viewpoints on automation's effect on white-collar unionization vary not only between camps but also shift within camps.

Some say automation will displace great masses of white-collar workers. Others say automation will create millions of new jobs.

Those who base their judgments on fact say that it is too early to tell just what effect automation will have on office and technical worker unionization.

UAW Hit — The UAW is one union that blames automation for much of their lack of progress with O&T workers. They claim automation has robbed it of 20,000 members in the past three years by putting office workers out of work. The fact is the union had 80,000 O&T worker members in 1957, it has 60,000 today.

The union offers a good overall example of the problems faced by white-collar unions. It defines a white-collar worker as an office, technical, clerical or professional employee.

The UAW points out three special problems in its attempt to organize white-collar workers:

White-collar people identify themselves with management.

When a company concludes bargaining with the union, it often passes along the benefits to the white-collar worker.

Management has a close association with white-collar workers.

The UAW's biggest white-collar membership is at Chrysler Corp., followed by International Harvester Co. and Douglas Aircraft. But the UAW says it really wants to break into General Motors Corp. and Ford Motor Co.

Early this year, Brendan Saxton became the new UAW director of organization. He quickly formed a white-collar section.

The first and only major test the UAW has faced so far is at the Chrysler missile plant in Detroit. The UAW didn't win, but it was surprised and hopeful at the election's result. The union claims it received 46 pct of the vote.

Work Rules Talks Stay Deadlocked

Steel industry and union work rules committee members can't even agree on a third member.

It shows little softening of positions by either side.—

By G. J. McManus

■ The steel industry's bi-partisan search for labor harmony seems to be doing no better than in last year's partisan effort.

This fact was indicated by the recent report of a union-management committee set up to study local working conditions. The report offered no recommendations for solving conflicts in this area. The two partisans had not yet even reached agreement on a neutral member to the committee.

Any encouragement in the statement was of a negative kind. The committee will not disband, although it has run over the Nov. 30 deadline set for recommendations in the contract. And neither side seized the occasion of the report for public blasts at the other.

Any Change?—The restraint of the joint statement and the privacy of talks so far may indicate a slight shift in the thinking of steel companies. Or it may imply some differences of opinion on the handling of work practices. (See Labor, p. 9)

But it takes a lot of straining to see in recent developments any reducing of the size of the problem or any softening of positions. Before and during the 116-day strike, the steel companies contended they needed contract changes that would make past practices less binding in deciding how plants should be run.

No Concession — The United Steelworkers refused to concede any substantial changes. However, the agreement signed Jan. 4 provided that a committee study the matter. This committee was to have a union member, a management member, and a neutral chairman acceptable to both.

Last week's report explains the absence of a chairman by saying "the committee has not determined the area of study in which a third party might be helpful. . . ."

The report avoids any account of committee opinions. Nor does it imply any change in attitude on the controversial 2-B clause in the contract covering local work practices.

Grievances Mount—According to company sources, the post-strike period has brought no relaxing of past practice doctrine on the part of the USW. Recession cutbacks have brought a heavy volume of grievances; violation of 2-B is nearly always charged in complaints, labor relations men say.

One mill is said to have an arbitration backlog extending out a year and a half. But no one seems hopeful that interim studies will improve matters.

In addition to working conditions, the study approach is being tried on incentives, seniority, economic guides, and other "human relations" problems.

Lots of Skepticism—The whole approach is regarded with skepticism by many. Says one executive: "If there is the will for accommodation, you can reach agreement in 20 minutes. More often than not, these study programs just produce more disagreement."

A top union official says it is too soon to evaluate the current effort.

"We're not bargaining, we're not taking positions," says Marvin Miller, who is coordinating the union's committee work.

MINE TO METAL: Ore from American Metal Climax Co.'s Climax, Colo., mine can end up as a pressed and sintered molybdenum billet for forging, melting or machining, such as this one cast by General Electric Co.

Molybdenum Market Expands

Moly breaks out of old market bounds of a steel alloy. New uses range from paint pigment to fertilizer.

In pure metal form, Moly finds use in missiles and electronics.—

By K. W. Bennett

■ When Ethan Allen, newest nuclear sub, slid down the ways she carried silos for 16 Polaris missiles. Molybdenum is the metal tough enough to contain the heat generated by the big Polaris engine. It's also tough enough to run uphill, marketwise, in a year when its traditional markets dropped.

A wonder metal in more ways than one, molybdenum metal powder sales will hit a record 2.7 million lb this year. The largest producers of molybdenum concentrate, American Metal Climax, Inc., will ship 50 million lb this year for a company record, according to president F. Coolbaugh.

Last week, Molybdenum Corp. of America disclosed its holdings of a large molybdenum deposit. The company will probably become the second integrated producer.

Industry sales of molybdenum powder, from which pure metal shapes are produced, are up at least 22 pct over record 1959.

Exports Up—The key to molybdenum's market upswing lies in two areas. European steelmakers, rediscovering the metal as a steel alloying agent, boosted their imports of oxide and concentrate from ths U. S. At the same time, U. S. users of pure molybdenum metal hit records.

Traditionally, molybdenum has moved with the domestic U. S. steel market. Almost 90 pct of molybdenum output has been used in alloying steel and tool steels. About 50 pct of automotive steel purchases, for example, are molybdenum bearing steels. This year has smashed that pattern.

Molybdenum compounds are used as paint pigment, in farm fertilizer, and even to boost lubricant life. The latter is an important, and relatively new market.

As pure metal, or vacuum arc melted metal, molybdenum has its most important markets in missiles and electronics. One source guesses electronics as a $21 million market this year, and one that grows at 8-10 pct per year. One supplier of pure metal reports 40 pct of 1960 sales will go to electronics builders.

Pure Metal Growth — Forgings and large machine parts for the missile industry accounted for the largest part of the pure metal market. Growth over 1959 was strongest in this area.

Molybdenum may be phased out of certain missile parts during 1961 and 1962 as temperatures of solid fuel rocket engines have been designed beyond the melting and erosion points of the metal.

New markets for molybdenum include probable entry into automotive electrical systems during 1961, to appear in 1962 model cars. It's holding in the aircraft and glassmaking markets, and is expected to expand in manned space and space-air craft, as well as the big new liquid-fueled rockets planned for space exploration.

Is Diversification Always Best?

Bridgeport Brass Moves to Concentrate on Metals

Many companies are in the process of diversifying. But here's one that's on the road back.

It recently sold two operations, and intends to expand in the field it knows best.—

By F. J. Starin

■ At a time when most companies are thinking about diversification, Bridgeport Brass Co. is moving in the other direction. And it's a move that will cost nearly $21 million.

Bridgeport has some ambitious expansion plans drawn up for the next five years. Yet, recently the company has shed two of its operations.

What's the reason?

Bridgeport president Austin Zender has set his sights on the metal industry—exclusively. This, he says, is where the company's future lies.

He notes, "One of the operations we have sold was our Aerosol Division. We first got into this during World War II when we started drawing cups for bug bombs for the military. Then we furnished the complete bomb. And, after the war we shifted to consumer products in aerosol cans.

Separate Organization — "We had to set up an entirely separate marketing and sales organization. And since what goes into the can is more important than the can itself, we hired a staff of chemists. It began getting too involved in areas about which we really knew very little. When the competition started to sharpen up, I decided it was time to get out."

Officially, Mr. Zender says, ". . . The future of the company lies completely in the metals field."

Bridgeport's biggest volume at present is in mill shapes of copper and brass, aluminum, and stainless steel. It counts heavily on these metals, particularly aluminum, for a major share of future business.

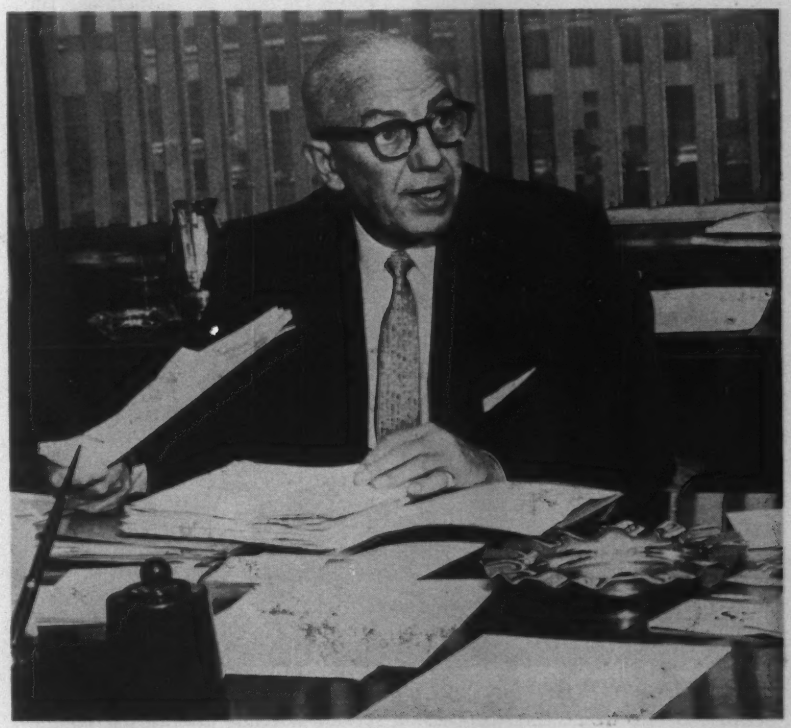
Ready For Any—"But we are ready," says Mr. Zender, "to work with any metal from aluminum to zirconium for which demand or potential demand shapes up."

Bridgeport also plans heavy concentration on alloy development. Mr. Zender says the advantage of this "all metal" approach is that "salesmen and engineers are handling all the metals except carbon steel and can be more objective in recommendations. The buyers realize this."

He also suggests that drawing back from markets past mill shapes takes Bridgeport out of competition with customers and "cements customer relations."

Won't Produce Aluminum—Despite rumors to the contrary, Mr. Zender does not plan to push Bridgeport in the other direction and start producing its own basic aluminum. "We might eventually have our own production," he admits, "but not unless we're forced to by price or supply situations."

Also, Bridgeport doesn't plan on losing any flexibility under its new concentration of effort. In fact Mr. Zender claims, "If the situation arises, we won't hesitate to change our system to the point where each plant will be turning out almost a complete line of metals." In keeping with this doctrine of flexibility, all plans are subject to revision.



AUSTIN ZENDER: "Our future lies in the metals field."

Service Bureau Move Grows

More and More Small Companies Ditch Paperwork

At one time, executives felt only large companies could afford electronic data processing.

Now, small companies form the backbone of business for the nation's service bureaus.—

By B. F. Surer

■ Fred Sarkis was a "small" business executive with a problem. As president of K.O.R., Inc., Rochester, N. Y., he discovered back in 1957 that the company's manual record-keeping system was costly, time-consuming, and, most important, inadequate.

Though he had what is considered a fairly conventional system and, by most standards, adequate, it was still failing to provide vital data.

Mr. Sarkis turned his bookkeeping work over to an electronic data processing service bureau. Through electronics, the bureau now furnishes K.O.R. with an extensive sales analysis and inventory reports on a monthly basis. And the cost, Mr. Sarkis estimates, is the same as the home-office manual operation.

Gaining Momentum—The move by small companies toward service bureaus is rapidly gaining momentum. Service Bureau Corp., one of the largest in the country, says 85 pct of its "regular" customers last year were companies with less than 100 employees. In all, SBC handles better than 10,000 individual accounts.

What, then, should be a company's status before considering the use of a service bureau?

Have a Reason—Martin L. Ellis, director of product planning for John Diebold & Associates, Inc., management consultants, points out that there must first be "economic justification."

He outlines the three basic users of the service bureaus as:

1. The company that is too small to invest in electronic data processing equipment. Yet, because of payroll, sales, or inventory problems, it feels a need for data programming.
2. Then there is the company which is growing fast enough to consider installing its own equipment. However, it uses the bureau facilities to train its programming personnel and "debug" its proposed system.
3. And there is also the company already using its own equipment, but to full capacity. At peak times, it turns over work to the service bureau or rents time on the computers.

Bureau Backbone — Most small companies fall into the first category and form the backbone of service bureau business.

Just how do these bureaus work?

Frank Chrinko, technical specialist for SBC, told The IRON AGE that there are four major steps taken by a service bureau between the time the initial contact is made and the signing of the contract.

When a bureau representative responds to your inquiry, he wants to know just why you desire to "farm out" the work.

Warning you that, "We will have to get nosey to get to the root of the problem," he begins to investigate your present methods. This investigation may take several extensive visits to your facilities—usually with one of the bureau's methods engineers.

When the problem has been analyzed, they return to their headquarters to work out the electronic solution.

A Detailed Report—After this, it's simply a matter of showing you

LESS PAPERWORK: More and more small companies are utilizing the facilities of electronic data processing service bureaus around the country. Bureaus, such as this one, usually relieve paperwork.

a detailed report of your present costs, problems and techniques, comparing this to the proposed bureau plan; explaining the responsibilities of both parties; and estimating the total cost to you.

Then the choice is yours.

Mr. Chrinko is quick to point out, too, that most service bureaus conduct this preliminary investigation at no cost to the prospective customer.

Are service bureaus economically feasible for small companies?

According to Diebold's Mr. Ellis, this depends solely on the individual problem, equipment and circumstances. The bureaus, on the other hand, claim that most jobs can be done just as cheap electronically.

No Capital Outlay — Their big sales pitch is that the small company can reap the benefits of electronic data processing without capital outlay.

An example is Crucible Steel Castings Corp., Philadelphia, a customer of SBC for almost a year. Its president, H. L. McClees, told The IRON AGE, "Our problem was one of sales analysis. The electronic data processing equipment breaks down our sales program each month by customer, salesman, number of pieces, weight and price."

He adds, "It answers many of our questions quickly. Because of this we can now analyze customer value to us, cost problems and salesman performance.

"Before last year, we didn't have as fine a breakdown."

Centers Everywhere—Almost every major city in the U. S. has at least one service bureau. Some cities, such as New York, Chicago and Los Angeles, have dozens.

Some bureaus are owned and operated by computer manufacturers. Chief among these are International Business Machine Corp., Burroughs Corp., Radio Corp. of America, and General Electric Corp. Most centers, however, are independent operations seeking and catering to small companies.

Hodges: A Friend Of Business

The selection of Gov. Luther Hodges as Secretary of Commerce puts a business "friend" in Kennedy's Cabinet.

He believes economic stimulation should come from businessmen themselves.

How much conservative influence he will have remains to be seen.

■ The selection of Gov. Luther H. Hodges of North Carolina as Secretary of Commerce puts at least one "friend" of business in the Cabinet of President-elect John F. Kennedy.

Sources in present Commerce Dept. posts say Gov. Hodges, a successful textile industrialist before going into politics, could be expected to always have the best interests of business at heart. They say he will be particularly "friendly" to the steel industry.

How much of a conservative influence Gov. Hodges will have on Sen. Kennedy's liberal plans for business remains to be seen. In appointing Gov. Hodges, you can be sure the President-elect took the North Carolinian's pro - business feelings into account. If there were some areas in which Mr. Kennedy did not agree with his new commerce chief, Gov. Hodges was surely made aware of them before his appointment.

Leans to the Middle—The new secretary is considered in the middle-of-the-road, politically. He is not expected to lean as far to the left as Sen. Kennedy seems to be.

But the two men have one basic agreement: That business is worse than President Eisenhower has let on, and something must be done about it. Gov. Hodges agrees with Kennedy that the rate of economic expansion should be pushed to 4 or 5 pct.

However, he makes it clear he believes stimulation should come from businessmen themselves.

Should Come From Business—This may be a basic disagreement with Mr. Kennedy, who puts more faith in Federal stimulation of business.

The new Secretary of Commerce laid his belief on the line this week. "The genius of this country is the imagination and energy and daring on the part of the businessmen," he said, "not in the Dept. of Commerce or any other fine bureaucracy."

He said the job of the Commerce Dept was to encourage the businessman, to be of service to him, and to be sure not to "throw any roadblocks" in his way.

Tests Underway In Slag-to-Steel

Prototype tests have started at the Anaconda Co., Anaconda, Mont. project that calls for use of the Strategic-Udy process to make steel from copper slag (IA Oct. 27, p. 11).

Webb & Knapp, Inc., says financing plans and construction schedules for the $40 million mill will be established when studies by Koppers Co., Pittsburgh, are completed in a few months. The tentative construction starting date is May, 1961.

Power for the project will be supplied by the Columbia River dams. Raw material will come from the slag pile of Anaconda Co. in Anaconda. Tests are now being conducted at the Niagara Falls, Ont., plant of Strategic Materials Corp.

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Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write Cromwell Paper Company, 180 N. Wabash Ave., Chicago 1, Ill. Dept. A12.

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Keep Pushing Product Research

You'll probably spend more time from now on thinking about product development and less about production.

Financing the research will be expensive, but vital. And the problems won't end when new products are developed.

■ Your company's search for new products and new markets may be getting more push these days.

If so, it's typical of the growing emphasis put on product research and development. And in the years ahead you'll be spending more time thinking about products—less about production.

What, Not How Much—This is a logical—and necessary—trend with plant capacity no longer a problem for many industries. It's become more important to know what to sell, and where, rather than how much can be made.

Ample capacity clearly gives the buyer many advantages. It can act to hold prices level or even bring about price reductions. It may also encourage users to keep inventories low—counting on fast deliveries, if needed. And it invites buyers to shop around, looking for new, and possibly better products and sources of supply.

But if unused capacity is good news for the buyer, it's bad news for the seller. Among other things, it increases competition and lowers profit margins.

Fight for Funds—In such a situation it's difficult—but necessary—for managers to justify stepped up product research spending. This is a particularly tough problem facing industries with heavy capital investment.

And even if money spent on product research pays off, new problems are created. Successful product development may lead a manufacturer away from the products being turned out. It can lead to new markets, new sales potentials—and the need to build new plants. In the years ahead deciding when and where to invest in new developments will tax management skills.

Multiple Problems — Developing new products is the beginning, not the end, of management concern. Two economists, George W. James and Leonard M. Guss, writing in the Battelle Technical Review, point out some of the results of new product development:

"The fruitfulness of research and development in producing new products creates situations which the service industries—transportation, distribution, financing, and the like—cannot handle.

"The full economic benefits of this country's $13-billion-a-year research and development efforts are often bottlenecked by the service industries' inability to use new products efficiently.

"Some of these problems can be handled by further product research . . . but there are many situations where further research will fail to provide an answer. And in some cases, additional product research may create more problems than it solves. . . ."

The proposed solution: Establishing a special service organization to anticipate and reduce problems that result from product research and development.

What Decides Job Rates?

■ What determines rates of compensation increases at all levels of management?

Some interesting conclusions are given in a report of the Executive Compensation Service of the American Management Association. At the top executive level, the study shows, the most important influences on increasing compensation and size of the operation and the type of business.

Different Measures—At the middle management level, the main factors are company size or responsibilities of the job, or sometimes both. With sales personnel, the importance of the selling job and the experience and skill of the salesman are vital. These, in turn, are greatly influenced by economic trends because about 75 pct of sales personnel studied are on commission or bonus arrangements.

For professional and scientific personnel the prime considerations are qualifications, duties, and responsibilities. In the case of first-line supervisors it's the scope and complexity of the activities supervised. And these are directly related to changes in pay rates for subordinates.

POSITIONING BREAKTHROUGH!

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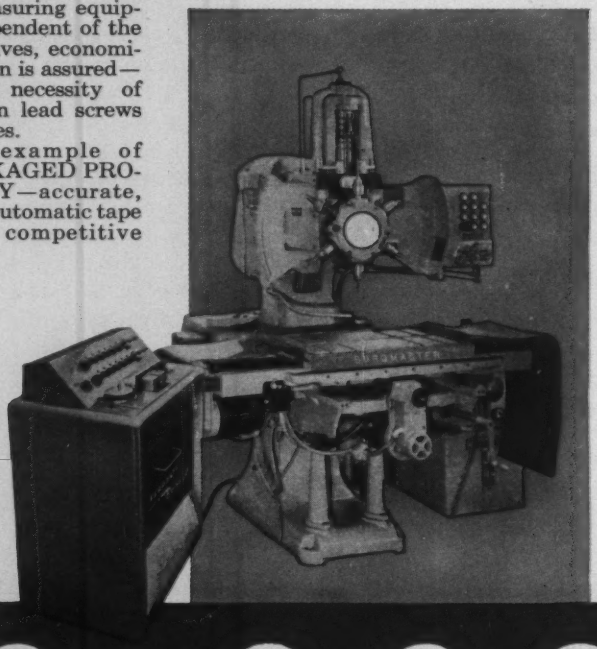

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THE Bendix CORPORATION

Our National Goals—2

The Economy

Growth: How Much, What Price?

Stepping up the growth rate may call for drastic measures. The question is, would it be worth the price?

Also, what steps can or should be taken to make our economy effective as well as democratic?

By E. C. Beaudet.

■ How fast can or should the economy grow to meet our national goals at home and abroad?

This question seems to have ballooned out of all proportion to the rest of the report made to the president by the Commission on National Goals. As commission chairman, Dr. Henry M. Wriston remarked last week, "those areas which have attracted most attention seem to have a dollar sign attached to them."

Nonetheless, controversy over the growth rate will not die down soon. A good part of it lies in the assumptions and methods employed to project future rates.

Key Factors — In making their report to the commission, panel experts Herbert Stein and Edward F. Denison, staff members of the Committee for Economic Development, came up with a growth rate of 3.4 pct. At this rate they contend the gross national product will hit $709 billion in 1970 and $972 billion by 1980. By way of comparison, the GNP ran about $510 billion in the second quarter this year.

The 3.4 pct rate, which many say is too low, hinges on two key factors: That unemployment is kept at 4 pct of the labor force; and the use of a longer (1929-1957), rather than shorter period (post-World War II), for economic analysis.

Other than reducing unemployment, now about 5.7 pct of the labor force, economists Stein and Denison feel this growth rate can be reached without more extraordinary measures.

Tax Policy—To maintain unemployment at this level, however, calls for steadily rising consumer demand, careful juggling of interest rates and money supply, and use of tax rates to stabilize the economy.

The 3.4 pct rate also assumes that the labor force in 1970 will be about 19 pct larger and average annual full-time working hours will run about 5 pct less than now. Also, that workers will be better educated, women will make up a greater percentage of the labor force and private investment will grow proportionately to past ratios of savings to GNP.

The jumping off point from the 3.4 pct rate, to higher estimates claimed by others, revolves around these assumptions and the part advancing technology has played in more recent years.

By taking 1929-1957 as a base, less weight is given to technological change than if the post World War II period is used. Stein and Denison feel the shorter period is less reliable and has special features which cannot be projected properly.

Big Question—Whether or not a 3.4 pct growth rate is high enough is not as important to these experts as the steps necessary to surpass it. For example, they claim if annual hours of work were to remain at the 1957 level, rather than to decline

NEXT WEEK

The Impact Of Changing Technology

Long strides in science and technology are altering the pattern of American life.

Next week The IRON AGE will analyze the effect of these changes as seen by panel members reporting to the Commission on National Goals.

5 pct as they expect, the 1957-1970 growth rate would be 3.6 pct.

Stein and Denison point out that a higher growth rate and reduction of work hours are both good things. The question is whether increasing the rate of growth is more important than reducing the annual hours of work.

Similar questions, they say, can be asked about other stimulants to economic growth such as more women workers, raising educational levels, higher public spending, tax changes to promote investment and more spending for research.

Extra Effort—Frank Pace, Jr., chairman of the National Goals Commission, claims that the 3.4 pct growth rate would be enough to take care of most of the goals cited: Jobs for 13.5 more million workers in the next ten years; improving living standards; and assuring U. S. competitive strength.

If, however, the growth rate is lower, taxes must be raised to meet higher government expenditures. If it goes higher, government spending and private consumption could go up without increasing tax rates.

To raise the growth rate higher than they estimate, economists Stein and Denison claim an extraordinary effort would have to be made by the American people. As they see it, "There is no reason to expect an increase in growth out of proportion to the forces that produce growth."

ECONOMISTS DENISON AND STEIN: Panel experts reporting on economic growth see a 3.4 pct annual growth rate without extraordinary measures.

Faster Steps—There are several alternatives open to stimulate faster growth, they say, above and beyond the rate they anticipate.

To jump the GNP one pct by 1970 and to add .1 to the annual rate, any one of these methods could be taken: Double immigration in ten years; cut the expected reduction in work hours by 25 pct; reduce labor losses one eighth; increase the ratio of gross national product to net investment by 1.1 pct above what it would otherwise be in the next ten years.

Other measures that might also be taken include: More effective use of resources and labor; better organization and direction of bigger research expenditures; and faster plant modernization.

Effective Action—If the panel report on economic growth stirs up controversy, so will a thorough reading of Dr. Clark Kerr's report to the commission entitled, "The Challenge: An Effective and Democratic Organization for the 1960's." Both reports, as well as others made to the Commission on National Goals, appear as chapters in a recently published book, "Goals for Americans."

In its report to President Eisenhower, the commission set the following objectives for a democratic economy:

"The economic society must be compatible with the political system. The centers of economic power should be as diffused and balanced as possible. Too great concentrations of economic power in corporations, unions or other organizations can lead to abuses and loss of the productive results of fair competition. Individuals should have maximum freedom in their choice of jobs, goods and services."

Just how democratic the economy is can be seen from Dr. Kerr's briefed analysis at right. In his report, however, Dr. Kerr, president of the University of California, goes on to say that the economy must not only be democratic it must also be effective.

More Direction—To be effective, i.e., to meet the public goals of higher living standards, economic stability, labor peace and national security, he feels there must be more direction to our economic organization and that government participation is essential to achieving it.

Just how the government should participate without endangering the democratic aspects of the economy is a problem in balance.

One way which he feels holds promise is through persuasive leadership of the executive branch of the government. Some of the methods include:

1. Broadening the functions of the Council of Economic Advisors to include the making of recommendations for actions necessary to the achievement of specific economic objectives.

2. Government assistance to industries going through difficult economic adjustments. This would call for government cooperation to ease the effects of automation through special retraining and placement programs.

3. In crucial, sensitive or costly areas, government agencies would take the lead in actual industrial development.

4. In labor negotiations the government might enter earlier, and make settlement proposals more aggressively, where there is a danger of a strike creating a national emergency. Despite this, Dr. Kerr feels collective bargaining still works best when the government stays out of it.

5. Government conferences among industry and union leaders to disseminate information and to help form opinion on such matters as wage and price stability.

These steps Dr. Kerr says, would help identify national responsibilities and help meet them without upsetting the balance of power.

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Eight Tests of a Democratic Economy

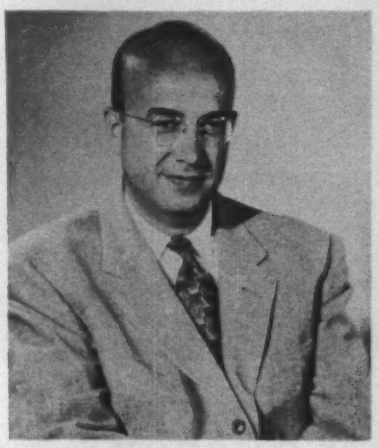
What They Are

1. Power Centers—As many as possible, consistent with effective operation. This includes: Companies within an industry, national and local unions, federal, state and local governments.

2. Balanced Strength — No one single group should dominate, particularly in labor-management area.

3. Separation — Along with church and state, goes separation of state and industry, state and labor, industry and labor.

4. Individual Choice — Freedom of choice among power centers.



KERR: Tests of democracy.

Wide opportunity to choose jobs and goods and services.

5. Membership Control — Individuals in power centers need some control over leadership. This goes for union members, stockholders, employees, consumers and individual companies within industries.

6. Legal Protection—Power centers should have judicial system to protect rights of members—an adequate grievance machinery both in unions and corporations.

7. Minimum Control — Private lives of individuals should be as free as possible from group control.

8. Government Controls—Should deal with procedures not issues.

How We're Doing

1. Quite Well — There are as many power centers in corporate and union areas as can be expected in a highly industrial society. "Workable competition" exists for the most part. Local power diminishes in strong national unions.

2. Overall Good—In many areas of the economy there is a rough, overall balance between management and labor. Weaknesses show up among unorganized labor and small employers. In service trades, employers have little or no effective bargaining power.

3. Weak Points — Management-labor collusion to fix prices and restrain trade exists in small-scale trades. More subtle is the "capture" of government officials and agencies by industries they are supposed to regulate.

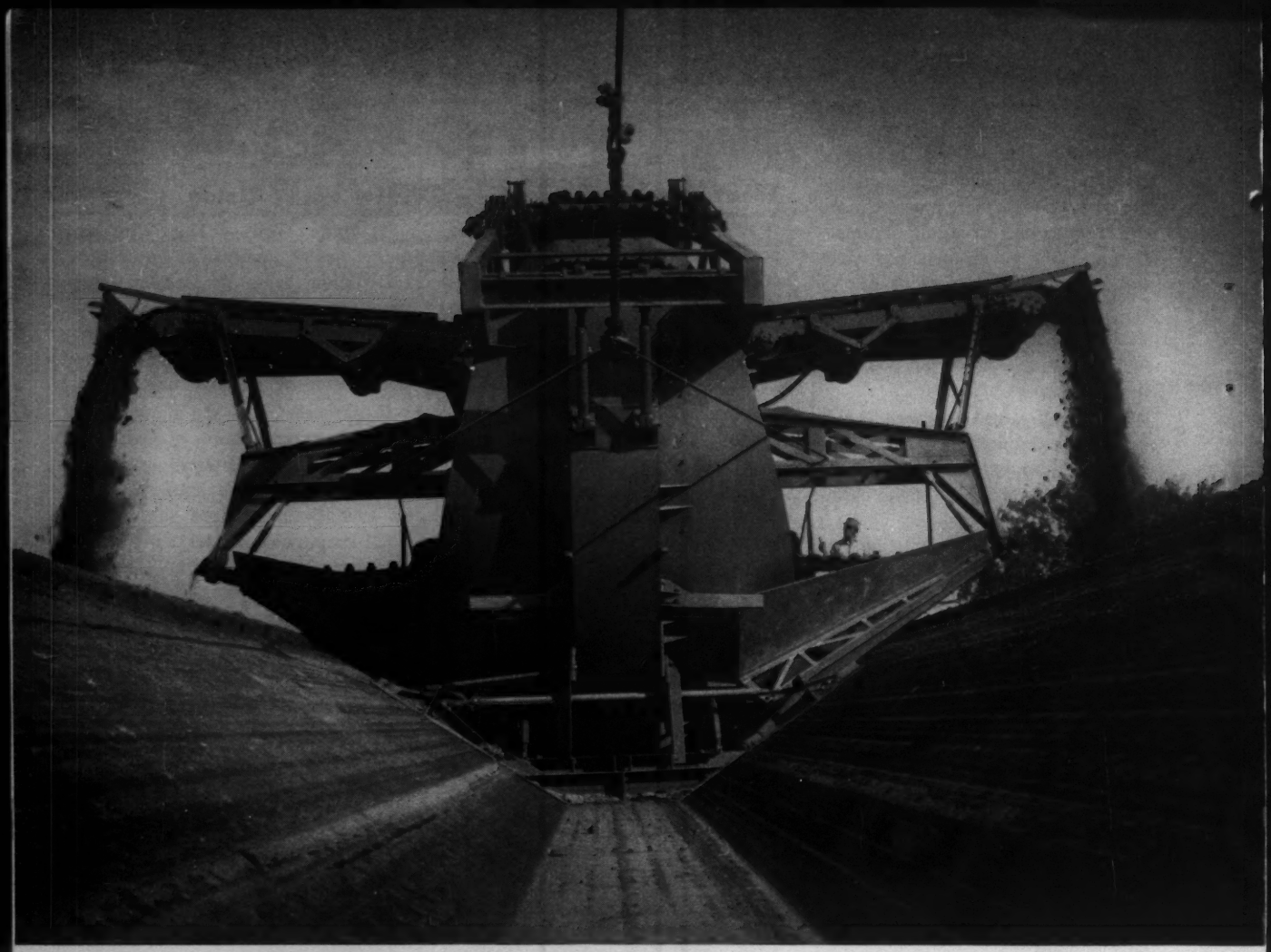
4. Relatively Free — Choice of goods and services is relatively free. But many job opportunities are closed to minorities.

5. Need Opposition—Unions and management, with few exceptions, are one-party governments. More opportunity for opposition to basic policies is essential.

6. Adequate Machinery — While collective bargaining has introduced independent judicial systems into industry, less attention has been given to the perfection of adequate grievance machinery within unions.

7. Major Problems — Pressure from unions and companies upon individuals to support political activities; inadequate vesting rights in pension plans; "Organization-Man" thinking, are major concerns.

8. Indirect Controls — Controls on procedures rather than economic matters, such as wages and prices, are traditional, except in times of national emergency. Direct controls have been applied mainly in the public welfare to regulate working conditions, banking and utilities.



World's fastest ditcher...rugged proof of M&T Murex electrode welding quality

In one minute this monster machine carves out seven continuous feet of ditch 6′ deep, 4′ across, at the bottom, 22′ across at the top. Working at top capacity of 800 cubic yards of earth an hour, the ditcher could keep a large fleet of dump trucks mighty busy. Gar Wood Industries relied on M&T Murex electrodes to give the ditcher's all-welded frame the brute strength needed to do its Herculean job.

It's a vote of confidence in the quality of Murex electrodes and M&T service when one company after another singles them out for the important welding jobs. Super tanker . . . world's largest power shovels . . . welded buildings . . . award winning bridge—these are some of the many other outstanding jobs done with Murex electrodes—where their performance in the hands of the weldor and in the working product explains their fine reputation among engineers and production men everywhere.

This is one of the world's broadest, and most carefully manufactured, lines of electrodes. Over 1000 types and sizes . . . and serviced by men who know their business. Ask the M&T man for details or recommendations. Or send for literature on the Murex line of electrodes.

M&T **welding products** · plating products
metals · coatings · chemicals

METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey

One Line Handles Two Bodies

Pontiac Solves Riddle of Two Car Sizes on One Line

Without making too many changes in assembly operations, Pontiac is able to build big cars and compacts on the same line.

Some unique design features help make it possible.—

By A. E. Fleming

ONE AFTER ANOTHER: Pontiac's compact Tempest, ready to be driven off the final assembly line, is followed by a full-size car.

■ Pontiac is proving it's possible to make unit body and body-and-frame cars simultaneously on the same assembly line.

At its main plant in Pontiac, Mich., the General Motors division's unitized Tempests and body-and-frame Pontiacs move over the line, one after the other, in any combination of body style.

The unique feat is accomplished at a great cost saving. There has been no need to add a bit of space to the plant's 950,000 sq ft assembly area to accommodate the new Tempest. Investment in new tools and equipment is kept at a minimum.

Assembly Changes—The advantage to Pontiac is clear when it's considered that Chevrolet, Buick and Oldsmobile build their compacts on separate assembly lines. (In some cases they can be made on the same line, but not at the same time as larger models.)

To turn the trick, Pontiac made some changes in its assembly setup. But they were simple ones. Mainly, they involved the addition of about half again as many jigs, or cradles, as were present. This was to accommodate the shorter wheelbase Tempest and its smaller wheels, suspension, transmission and differential.

Unusual Features — The unusual design features of the Tempest made the whole arrangement possible. The key is the Tempest's torque tube which houses the flexible drive shaft. It connects the front engine with the rear transmission. And it literally holds the chassis together as it travels down the assembly line. In effect, the Tempest's engine, transmission and connecting drive shaft comprise a rigid frame in themselves.

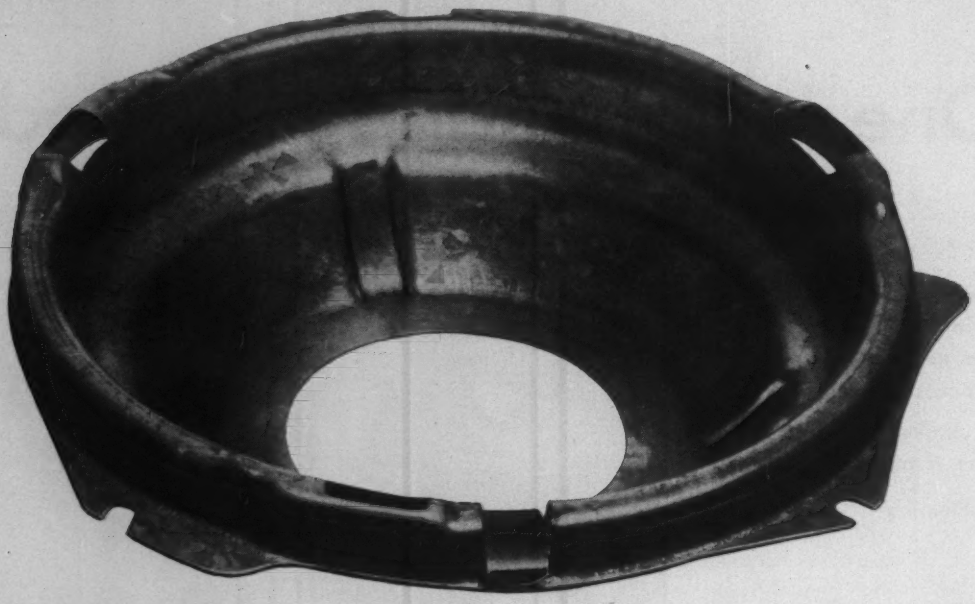
After the muffler, gas and fluid lines, gear shift lever and other components are installed, the body is dropped down. Then the wheels are put on and the radiator, fenders, hood, grille and bumpers are installed.

New Routine—The coming of the Tempest necessitated some changes in the assembly routine of the big Pontiac, but, again, not many. This year, for example, the Pontiac body is dropped before the wheels go on. Also steering columns are now attached in the body before it's lowered.

In the past, the wheels were attached to the chassis before the body was lowered. And the columns were installed on the chassis, then body dropped over it. Now the body drop operation is simpler since there is no need to guide the body over the steering columns.

Evenly Divided—A walk through the Michigan plant shows that currently the plant's production is divided about evenly between Tempest and Pontiac. However, Tempest production is currently in the build-up stage. Pontiac has reached a steady production pace because output of the bigger car began a month earlier than the compact.

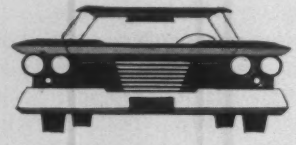
Better products through better methods and steels



How zinc-coated steel cut 5 steps from automotive lamp housing fabrication.

When automotive head and tail lamp housings were drawn from cold rolled sheet steel and then zinc-plated or painted, as many as five or six handling and cleaning steps were required to make them corrosion-resistant.

Now, fabricated from Weirkote continuous-process zinc-coated steel, the housings go directly from the press to the assembly line. Further processing is unnecessary because Weirkote can be worked to the limits of the steel itself without chipping or flaking its corrosion-resistant zinc surface.



It's this superiority that caused the automobile industry to increase its consumption of zinc-coated steel more than 700% in five years; to use it in such varied applications as mufflers, window channels and the understructures of unitized bodies; to take advantage of developments such as differentially zinc-coated steel that can be welded at top production-line speeds.

A major supplier is Weirton Steel Company—producer of Weirkote continuous-process zinc-coated steel sheets and many other excellent steels that are improving products, methods and profits throughout industry.

Galvanized Steel

Look for the STEELMARK on the products you buy; place it on the products you sell.

WEIRTON STEEL
Weirton, West Virginia

WEIRTON STEEL COMPANY

Weirton Steel is a division of **NATIONAL STEEL CORPORATION**

Weirkote will also be available in 1961 from National's Midwest Steel Division, Portage, Indiana.

Farwest Awaits Dam Projects

Several Projects Are Pending U.S.–Canadian Talks

There could be a series of starts on new dam projects in Pacific Northwest next year.

But first, the United States and Canada must reach agreement on flood control.—

By R. R. Kay

■ Watch for new dam starts in the Pacific Northwest next year. These projects could move into the billion dollar bracket.

Several large projects are now in the works. Seattle is waiting for the go-ahead on its proposed Pend Oreille River dam, and on a multi-million dollar addition to the Gorge Dam in the Northern Cascade Mountains.

The Pend Oreille project is under consideration by the Federal Power Commission. Both proposals depend upon the outcome of negotiations between the U. S. and Canada. Canada wants to make sure there won't be flooding across its border.

There's Opposition—Mining groups oppose the Pend Oreille project, claiming their operations will be flooded by the backed up water.

Several other applications for dams on the Lower Snake River are also pending. There's a good chance that work could start within a year on one or more.

And that's not the end of the applications for dam sites. The Pend Oreille County Public Utility District wants a 300,000 kw installation near Seattle's Boundary project. Pacific Northwest Power Co. proposes a Mountain Sheep dam on the Snake River. And the Washington Public Power Supply System wants permission to proceed at the Nez Perce site, just below the mouth of the Salmon River.

Agreement Near—U. S. and Canada seem about to agree on the border question. Insiders say Canada will get half of the power generated on the U. S. side from dams with storage in Canada. Also, it will receive $3 million annually for flood control.

The border question is an old and sticky one. If it's settled now, there will be two immediate results:

(1) The U. S. could go ahead with the Libby Dam in Montana, stalled 10 years.

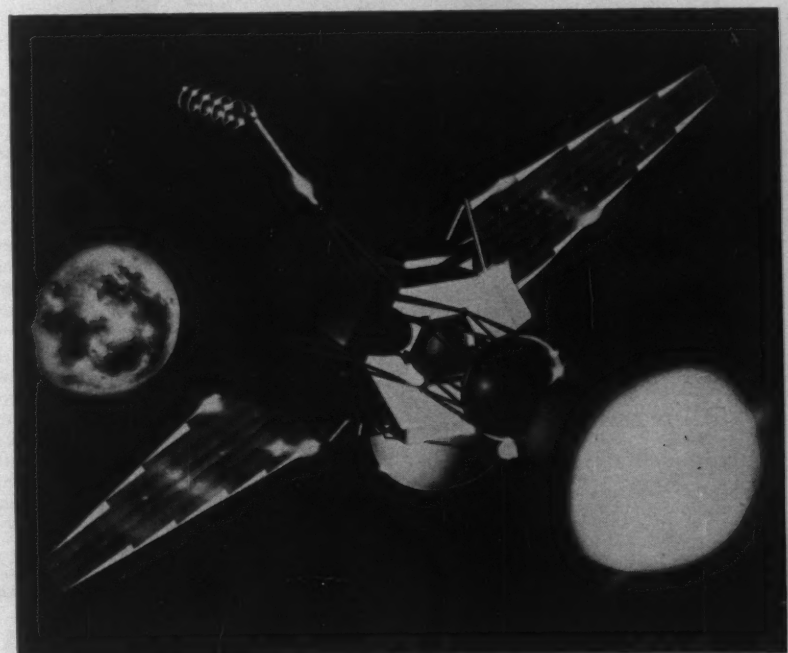
(2) Canada could start its Arrow Lakes, Mica Creek, and Duncan Lake dams. These will add 2.5 million kw, all generated in U. S. plants.

Puget Jobs Sound

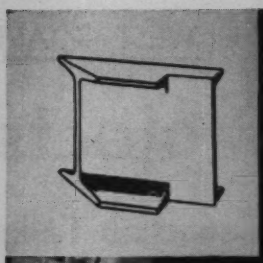
Recent Navy cutbacks won't affect employment at Puget Sound Naval Shipyard, Bremerton, Wash. The cutbacks were ordered to stretch the Navy's budget for ship construction and repair.

At Bremerton, Rear Adm. William A. Dolan says the base has already made all practical reductions. The yard employs 9200 persons.

Work Advances on Moon Capsule



CRASH PROGRAM: This is the final configuration of the 300 lb lunar capsule being built by Ford Motor Co.'s Aeronutronic Div. It is designed to crash-land on the moon and transmit data back to earth.

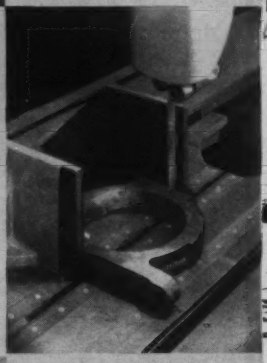


COPING AND MITERING HEAVY STRUCTURAL SHAPE

18" Beam (above) is held between vises for the short cut. On the long cut (left) vises were removed and beam held by simple clamp. The MARVEL Band Saw is truly indispensable in ornamental and structural iron shops where this type of work is done daily. The machine will cut-off square, miter and cope any work shape from the smallest moulding to 18" I-beams.

SPLITTING CLAMP RINGS, BUSHINGS

Splitting clamp rings, connecting rods, bushings and collets is a fast, simple operation on the No. 8 Band Saw. Perfect control, quick chucking facilities, accuracy and speed are features that especially fit the machine to handle this type of work.

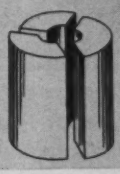


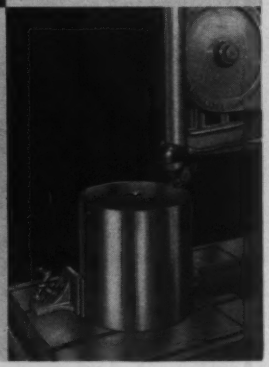
MITERING LARGE DIAMETER PIPE

Pipe (or any bar shape) may be mitered at a 45° angle without the need for special jigs or fixtures. Even when cutting miters, work remains in the same position as it does for straight cuts. Column and blade are instantly tilted to desired angle, even without stopping the machine. Perfect miters (or lesser angles) are sawed without any layout or special equipment.

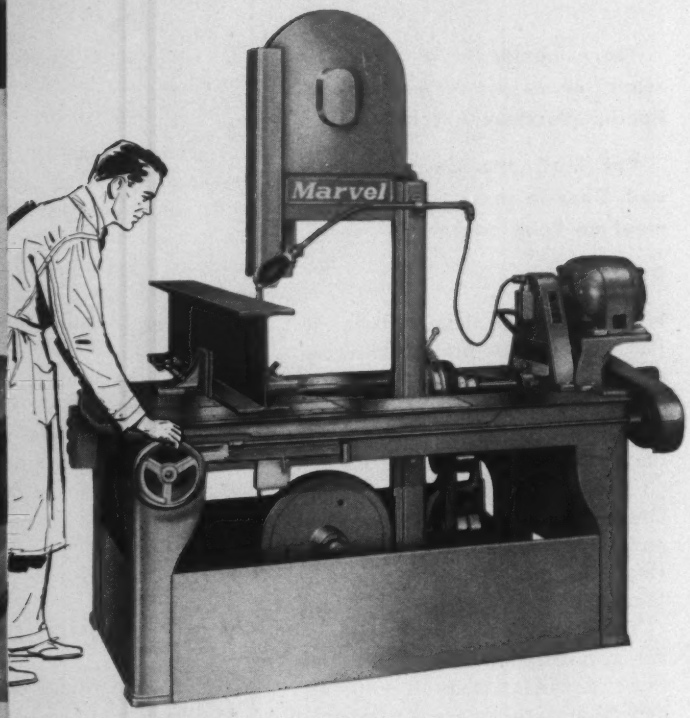
SEGMENTING LARGE DIE BLOCK

Three equally spaced re-entrant cuts were made in this 16" x 18" SAE 4130 Forging. Job was completed, floor-to-floor in 5 hours. No special jigs or fixtures were required. An unusual job that serves to emphasize the versatility of the MARVEL No. 8 Saw.





"The One Machine We Couldn't Do Without"



"As simple to use and handy as a Scout Knife" is the way another user described his MARVEL No. 8 Universal Band Saw recently . . . and we can't think of a better way to describe this versatile metal cutting machine.

With a MARVEL No. 8 Band Saw, you can do almost any conceivable straight, angle, or miter metal sawing job—from cutting-off bar stock to making the most unusual forming cuts. You can handle small, delicate work, and in the next minute, saw structurals, or segment large work as illustrated in the lower photograph. You will save time, labor, and material with a MARVEL No. 8 Band Saw because no other saw has all the features to be had in this truly universal tool.

Upright column design and forward travel of the blade through the work (which remains stationary on the table-height saw bed) provides easy, unobstructed visibility and more convenient and efficient working conditions; column can be tilted and locked at any angle up to 45° left and right of vertical; the exclusive MARVEL Power Feed with Automatic Overload Relief; Automatic cutting-depth stops; simple, convenient operating controls—these are some of the features which make the No. 8 Band Saw the most useful—and used—metal cutting saw on the market.

For the complete story, ask or write for Bulletin 875 which illustrates and describes MARVEL Universal Metal Cutting Band Saws.

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Inserts Will Work in Cutters

Many Early Problems Have Been Eliminated

Five years ago, industry seemed on the verge of adopting throw-away milling cutters.

Design has moved ahead. But many companies are still wary of throw-aways for finishing. Why?—

By R. H. Eshelman

■ Based on a survey a few years ago, metalworking is eager to use throw-away inserts on milling cutters. The payoff would be substantial. Milling operations potentially can use more throw-aways than other machining jobs, such as turning, boring and facing.

William Bader, vice president, research, for Wesson Co., thinks the change failed to come about because of cutter design problems, specifically run out.

Greater Potential — The survey showed that two out of three companies had strong interest in the "no-grind" milling cutters.

Optimism was logical, according to Mr. Bader. The savings potential per tool is far greater for milling-cutters than for single-point tools.

Where plants said they were not using throw-away inserts for any types of operations, they usually gave "lack of personnel or time for analysis or application" as their reason.

Never Materialized—The rush to throw-away milling never really materialized. Throw-away milling cutters have been confined to roughing operations where run-out variations blade-to-blade are not too important.

When production engineers realized that conventional cutters would have to be used for finishing operations, they were in no hurry to install throw-away roughing cutters. Industry didn't want to live with a 'double standard' and its disadvantages.

Run-Out Problem—Making cutter bodies more accurate does not solve the run-out problem. Even cutter bodies with virtual zero run-out, results are hardly good enough. Tolerances on commercially ground inserts are not tight enough, and much of the savings inherent in throw-aways is lost if specially ground inserts must be used.

Solution to this problem has come indirectly. Efforts to give precise adjustment on throw-away boring bars and heads provided a clue. The answer is a cam pin in the back of the insert slot. This pin can be adjusted and locked to locate individual inserts within tenths.

Commercial Inserts — Result is that commercially ground inserts can be used and tooth load equalized. With only routine setup procedures, surface finishes of 60-100 microinches, rms, are obtained. This covers most production-type finish-milling operations.

Where finer finishes are required, greater care can be used in adjusting the cam pins. Also another new development—a micro-finishing insert-helps. Just replace one regular insert with a micro-finishing blade in the cutter. With this you can get finishes below 50 micro-inches, rms.

FINISHING CONFERENCE: A process engineer and a Wesson field engineer look at results of new design throw-away insert milling cutters.

INDUSTRIAL BRIEFS

Improved Production Facilities—Loma Machine Mfg. Co., Inc., New York, is designing and building an integrated casting and sawing installation. It is for the production of copper billets to be supplied to Manufacturas De Cobre S. A. (Madeco), Chile. New equipment is part of a program undertaken by the Chilean company to improve production facilities at its plant in Santiago, through the help of a loan obtained from the Export-Import Bank, Washington, D. C.

A Cleveland Expansion—Work has started on the expansion of the Cleveland facility of Arcrods Co. The 50,400 sq ft addition at 4437 E. 49th St., Cuyahoga Heights, will cost about $800,000 and will be used for wire drawing operations. New facilities will make steel inventory more flexible and permit improved service through stockpiling.

Low-Cost Safety Training — A low-cost safety training course for industrial foremen has been developed by the National Safety Council. The course consists of a series of six text booklets entitled "Men and Motives in Safety Supervision," and a manual for discussion-group leaders. Further information is available from the Council, 425 N. Michigan Ave., Chicago.

Expansion Cost of $2 Million—A major expansion of facilities to produce extrusion billet is underway at Kaiser Aluminum & Chemical Corp.'s Chalmette, La., primary reduction plant. The expansion will increase the plant's capacity for casting high-quality billet by about 50 pct. The project is expected to be completed during 1961 at a cost of about $2 million.

Plant Planned—Woodward Iron Co., Woodward, Ala., plans to build a new sintering plant. W. R. Bond, president, has gone to Europe to inspect several iron ore sintering plants in search of ideas that may be used in building the Woodward plant. The new ore sintering plant being built at Wenonah, near Birmingham, is nearing completion. It will be the largest in the South.

Encompassing Move—The Norden Div. of United Aircraft Corp. is in the process of moving into its new facility in Norwalk, Conn. This plant will encompass those operations which are currently functioning in White Plains, N. Y., Stamford, Conn., and Milford, Conn. The Ketay and Data Systems Depts. of Norden, operating at Commack, Long Island and Costa Mesa, Calif., respectively, will continue unchanged.

Building to Supply—Kaiser Aluminum & Chemical Corp. will build an aluminum fluoride plant costing about $1.4 million at its Gramercy, La., works. The facility will be built by the middle of next year and be completed in the third quarter of 1962. It will supply a major portion of the aluminum fluoride requirements of the corporation's reduction plants.

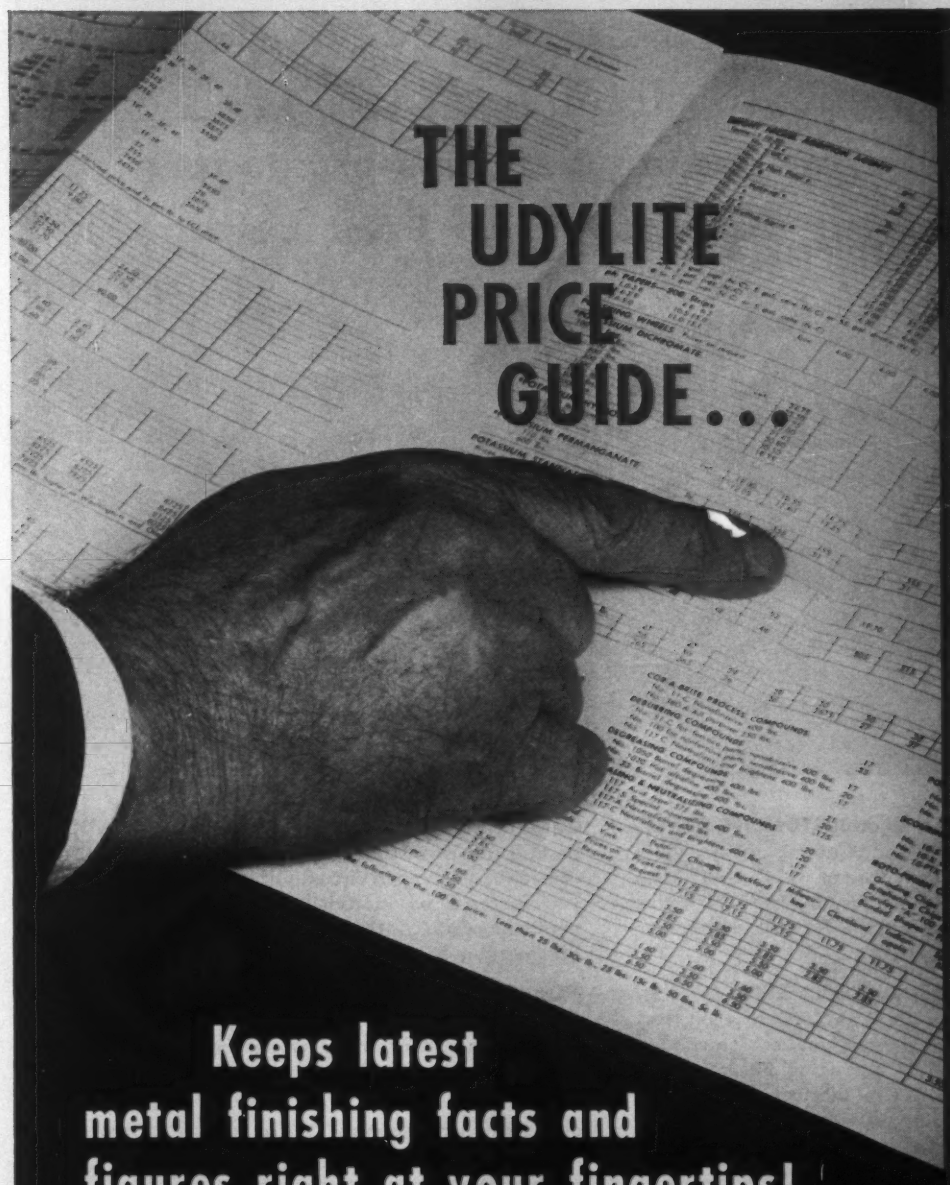
An Acquisition—The American Radiator & Standard Sanitary Corp., New York, has acquired the Rochester Manufacturing Co., Inc., Rochester, N. Y. The Rochester company will now be operated as a part of the Detroit Controls Div. of American - Standard which maintains headquarters in Detroit.

Townsend Gets Boots—Townsend Co., Beaver Falls, Pa., acquired the Boots Aircraft Nut Corp., Norwalk, Conn. Townsend Co., itself a subsidiary of Textron Inc. of Providence, R. I., manufactures cold formed fasteners and special parts. It has seven operating divisions with eight plants in the U. S. and Canada.

For Pipe Coating — Pipe Line Service Corp., a subsidiary of American Steel Foundries, Chicago, has started construction of a steel pipe coating and wrapping plant in Youngstown, O. The 94,000 sq ft plant will be the eighth pipe coating plant in Youngstown, O. It will be completed in April, 1961.

Show Business Heads for Texas

IT PAYS TO DISPLAY: This newly-built standard boring, milling and drilling machine, a Jigmil, is being shipped from DeVlieg Machine Co., Royal Oak, Mich., to Amco, Inc., Abilene, Tex., tool and die specialists for the aircraft industry. Amco will use it to machine precision aircraft and guided missile components. Before placing an order for it, Amco president Jack Hughes made a special trip to the recent National Machine Tool show to see a similar machine in action.



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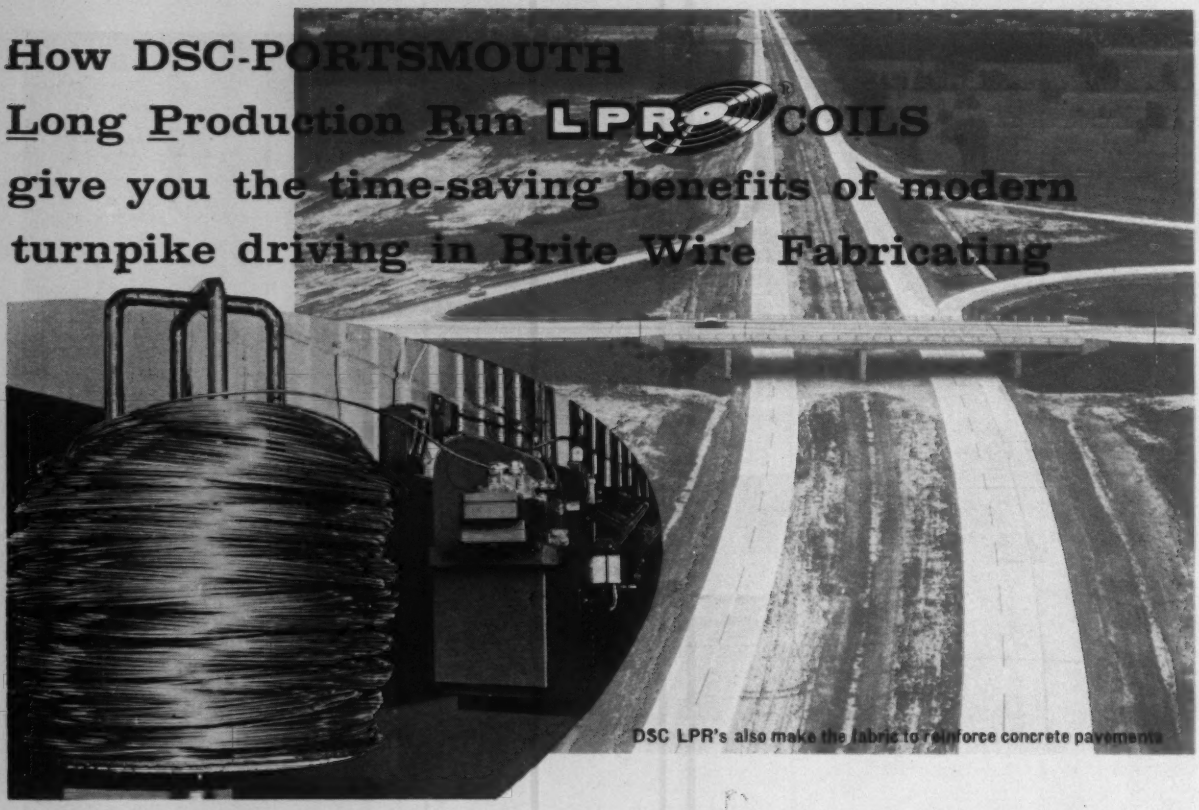


DSC LPR's also make the fabric to reinforce concrete pavements

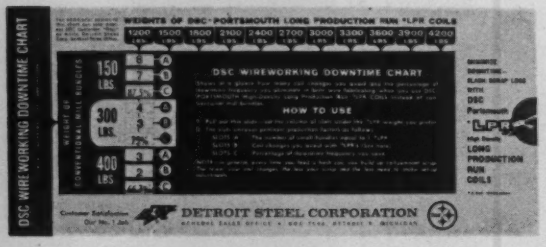
THIS PICTURE WAS TAKEN IN A CUSTOMER'S PLANT. It shows a Straightening and Cutting setup while feeding an average of 2055 lbs. of 3/16" round brite wire per coil. This job keeps running for 1½ miles without slowing down or stopping for coil changes or setup adjustments.

HIGH-DENSITY (high weight per cu. ft.) LPR's come in free-standing coils that weigh from 1000 to 4200 lbs., depending on your wire gauge. One customer, for example, orders 10 ga. coils averaging 2210 lbs. for more than 8 miles of non-stop fabricating. In fact, LPR's can give you up to about 40 miles of brite wire fabricating with time-saving benefits akin to those in turnpike driving.

COMPARED WITH TRADITIONAL MILL BUNDLES—besides the Downtime you save with LPR's you slash coil-remnant scrap in virtually the same ratio. RESULT: you increase productivity and reduce material and manhour costs . . . thereby widening your manufacturing margin, bolstering your competitive position.

MORE LPR BENEFITS: You conserve coil storage space, reduce over-all material handling time and expense, improve inventory management, and rid yourself of small coil racks and the bother of caring for vendors' returnable carriers.

FOR DETAILED INFORMATION about how LPR's can help *you* save wireworking time and money, call your nearest DSC customer "Rep" or write *Detroit Steel Corporation, Box 7508, Detroit 9, Mich.*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J. M. Adler, elected executive vice president, Roblin Inc. He succeeds **J. J. Risman** who was recently elected president.

Associated Spring Corp.—**Wallace Barnes,** elected executive vice president.

The Yale & Towne Manufacturing Co.—**H. P. Valentine,** elected vice president—international.

Drake Steel Supply Co.—**A. H. Weinert, Jr.,** named vice president, operations.

Enamel Products & Plating Co.—**Julius Raven,** appointed vice president.

Brown-Wales Co.—**R. A. Ives,** promoted to vice president, marketing—in charge of sales, purchasing and operations; **A. M. Wales,** elected vice president, finance.

Consolidated Electrodynamics Corp.—**Dr. C. F. Robinson,** elected as a vice president.

Graver Tank & Mfg. Co., Div. of Union Tank Car Co.—**R. W. Johnson,** appointed vice president, marketing and sales.

Indiana Steel Products Div., Indiana General Corp.—**P. M. Wheeler,** named vice president and general manager.

Metals Div., National Research Corp.—**J. O. Denis,** appointed supervisor, chemical operations.

Continental Screw Co.—**Edward Pettengill,** appointed manager, production control and **R. L. Tripp,** appointed purchasing agent.

Steel Plate Div., Posey Iron Works, Inc.—**R. K. Strayer,** appointed sales manager.

Daystrom, Inc., Weston Instruments Div.—**J. F. Morten,** appointed manager, marketing services.

National Automatic Tool Co.—**R. E. Oliver,** appointed head of the Purchasing Dept.

Penco Div., Alan Wood Steel Co.—**A. F. Lang,** appointed New York district sales manager.

Denison Neale, appointed vice president, marketing, Denison Engineering Div., American Brake Shoe Co.

Pratt & Whitney Co., Inc.—**T. R. Klecak,** appointed West Coast regional manager, industrial distribution.

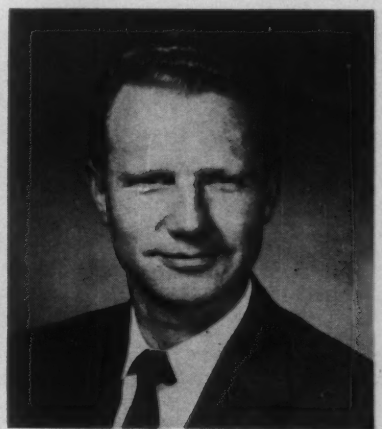
Union Carbide Metals Co.—**B. J. Haley,** appointed manager, Ashtabula Works.

Midwest Steel Corp.—**H. E. Westbrook,** appointed general foreman, maintenance, Cold Reduction and Sheet Finishing Dept.

Hughes Aircraft Co.—**Dr. Henry Swift,** appointed asst. director, in-

A. J. Paddock, appointed administrative vice president-fabrication and manufacture, U. S. Steel Corp.

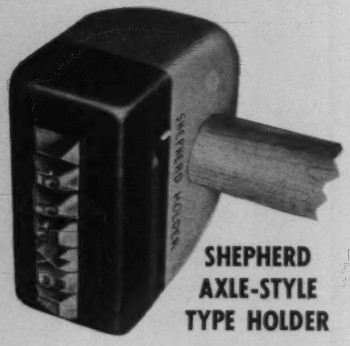
J. D. Rollins, appointed president, American Bridge Div., U. S. Steel Corp.



H. D. DeBorde, appointed director, manufacturing, Burroughs Corp.

MARKING TOOLS

Like other tools, marking devices are made for specific needs. Whatever the need, Matthews can provide suitable equipment designed for rugged industrial applications. Three examples are illustrated.



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For marking forgings, ingots, billets, etc.

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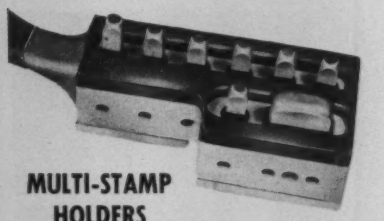
Special engraving, heat treatment and selection of steel, places these stamps in the right group for heavy duty work.



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frared laboratory at the company's Santa Barbara Research Center, Santa Barbara, Calif.

Brooks & Perkins, Inc.—**W. O. Chamberlin, Jr.,** appointed director, marketing.

W. R. Young, appointed vice president, C. A. Armco Venezolana, Caracas, Venezuela.

Jones & Laughlin Steel Corp.—**R. I. Baierbach,** appointed chemical engineer, Tin Plate Dept., Aliquippa Works.

Duff-Norton Co.—**W. P. Callahan,** appointed sales representative, upper New York State, western New England and northeastern Pennsylvania.

Dr. E. M. Koeritz, appointed manager, manufacturing, Metallurgical Products Dept., General Electric Co., Detroit.

L. E. Bonnette, named director, engineering, Denison Engineering Div., American Brake Shoe Co.

B. F. Goodrich Industrial Products Co., Div. of The B. F. Goodrich Co.—**E. L. Byan,** named Minneapolis district manager.

Rea Magnet Wire Co., Inc., Div. of Aluminum Co. of America—**I. J. Barclay** and **R. R. Cope,** appointed general sales managers.

WaiMet Alloys Co. — **G. D. Haley,** appointed supervisor, hardsurfacing rod production.

G. F. Marriott, named superintendent, Indianapolis plant, Jones & Laughlin Steel Corp.'s Stainless and Strip Div.

Metal & Thermit Corp.—**D. C. Pratt,** appointed project supervisor, central engineering; **R. E. T. McMahon,** appointed market develop-

ment engineer, Commercial Development Div.; **W. C. Archinal,** appointed superintendent, coatings production, Carrollton plant, Coating Div.

C. A. Grim, appointed product sales manager, Cold Rolled Specialties Div., Crucible Steel Co. of America.

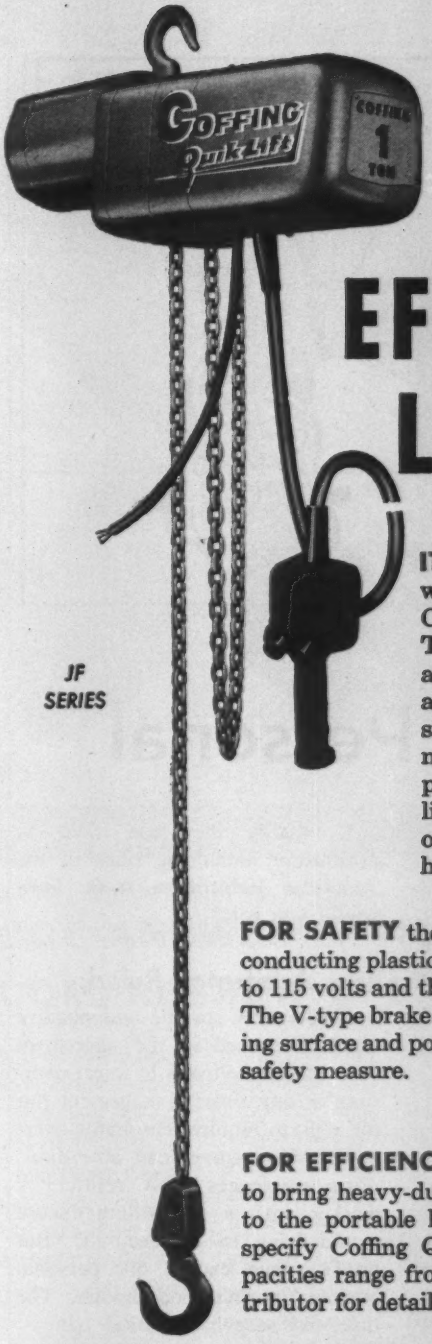
J. R. Connell, named administrative assistant to the president, Jessop Steel Co.

Yale Materials Handling Div., The Yale & Towne Manufacturing Co.—**Alvan Markle,** appointed purchasing agent.

Electronics Div., Stromberg-Carlson—**G. N. Krassner,** appointed product manager for astronautics equipment.

OBITUARY

H. E. Taylor, 60, superintendent, Coke and Chemicals Dept., Alan Wood Steel Co.



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IT'S EASY to raise or lower loads while pulling a trolley mounted Coffing Quik-Lift Electric Hoist. The pistol-grip control station and the combination strain cable and control cord makes this possible. The light but strong aluminum housing provides ease of portability. Changing voltages, limit switch, type of suspension or chain is quick because the housing is in sections.

FOR SAFETY the control station is made of non-conducting plastic in which the voltage is reduced to 115 volts and the push-buttons are interlocked. The V-type brake which provides maximum braking surface and positive control of loads is another safety measure.

FOR EFFICIENCY this hoist has been designed to bring heavy-duty performance plus durability to the portable hoist field. It will pay you to specify Coffing Quik-Lift. Twenty models—capacities range from ¼ to 2 tons. Ask your distributor for details or write for Bulletin ADH-65.

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YOU ARBITRATE IT!

Strictly Personal

■ Paul F. was offered a promotion in a shop making garden equipment. He was told that the job required occasional overtime. Paul didn't like this because it would interfere with his busy social life. But he was ambitious to get ahead in his trade; so he accepted the upgrading.

Every time he was asked to stay late he found an excuse. Management got tired of his begging off for "personal reasons" and gave him a three-day disciplinary layoff.

A Matter of Time—"You can't do this," he protested. He cited a contract clause that read: "Overtime hours refused will be considered as overtime hours worked in equalizing overtime." Paul reasoned that since the contract made provision for refusal of overtime, a man couldn't be disciplined for it.

However, management interpreted the contract differently. "That provision relates to equalization of overtime among those who want to work. It does not limit our right to insist upon a reasonable amount of extra time."

Eventually the case went to arbitration under the rules of the American Arbitration Assn. How would you rule?

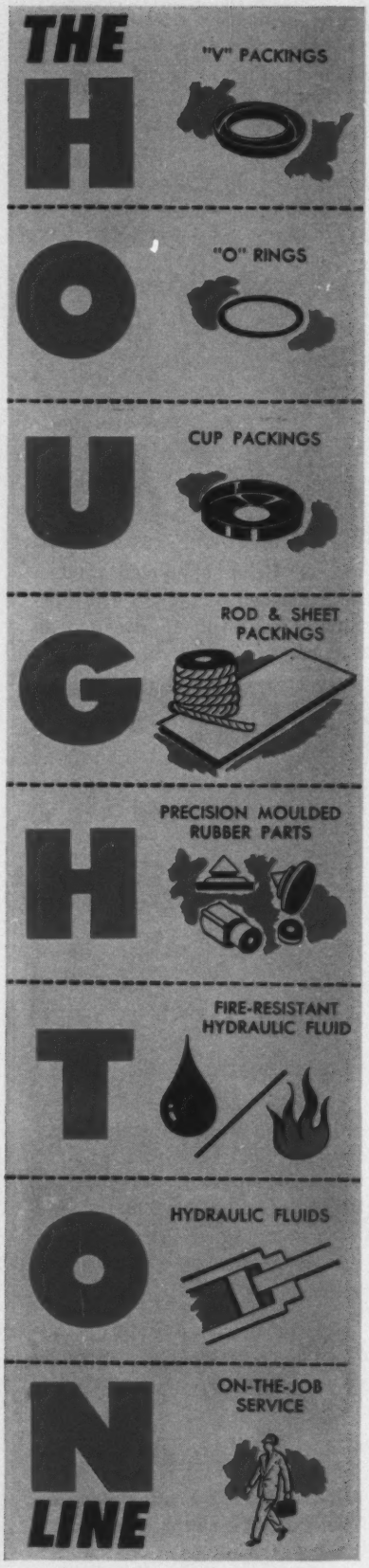
The Arbitrator Ruled:

Unless very specific and positive words are used in the agreement permitting employees to reject overtime at any time, management has the right to require reasonable overtime. Management can also discipline employees who refuse. A worker with a compelling excuse would have to be excused. But Paul's vague excuse of "personal business" wasn't good enough. The three-day suspension stood.

From the files of
The American Arbitration Association

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the January 12 issue.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.



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Fortified Houghto-Safe Fire-Resistant Fluids would have prevented the explosion. And because Houghto-Safe is *fortified,* it would also have provided all the lubricity needed to assure long compressor life.

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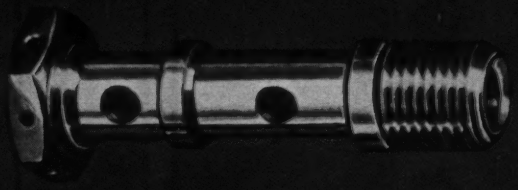
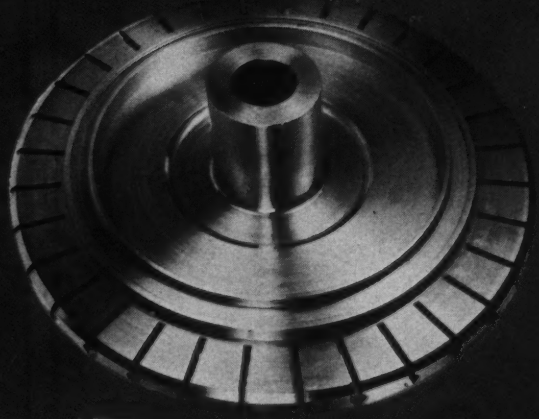
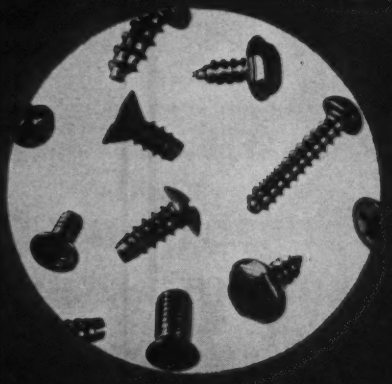


you can machine it...



you can head it...



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Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

Modernize for Space Age

Emissaries of the Air Force are quietly spreading the word that contractors who want to do business in the Space Age will need to update their facilities. The reason: to meet exacting demands of working with the new materials. It's understood the Air Force may even lend a helping hand in financing for critical production jobs.

Call for Wide Sheet

Look for a sharp gain in the availability of larger sheets of pure molybdenum during early 1961. Increased attention in the Dynasoar and B-70 programs boosted Air Force needs for wider sheet, both in tungsten and molybdenum. Sheets 24-36 in. wide are being sought in lengths to 72 in. It appears that some movement in this direction is already under way.

Sprays Chemical Etchant

For chemical milling of some heretofore impossible shapes, a new setup continuously sprays the etchant on the material. Early results are quite promising. This advance may well extend potentials of the process to make possible many parts and combinations not attempted before, such as needed for missile design.

Glass Takes Missile Role

Glass is playing a vital role in the new improved Polaris missile. The rocket motor case is made of fiberglass reinforced plastics. It's made by winding resin-coated glass filaments on a mandrel which has the shape of the rocket chamber. Advantages claimed for new process are: simplicity, flexibility, low cost, and high production rate.

Push Samos Program

The Samos reconnaissance satellite program is being pushed by the Pentagon to get it in operation as soon as possible. More than $280 million is being spent on the program this year. Also, management of the Samos project is being streamlined. Defense officials, disturbed by the lack of intelligence information which the U-2 flights used to get, are backing the big push. But, despite concerted efforts, Samos will not be operational for at least two years.

Photographs Temperature

Scientists at the National Aeronautics and Space Administration have come up with a photographic method for measuring temperatures. With this technique, a temperature-contour map of heated surfaces can be made. Lower limit of use is about 1400°F using standard photographic equipment. Upper limit depends on calibration method and accuracy needed.

Forging Picture Widens

The heavy forging press program of this country is speeding U. S. conquest of space, stated W. C. Kunkler, Jr., of Wyman-Gordon Co. at the annual meeting of ASME. Future forging applications, he added, will be as broad as the range of missile and space programs, and as varied as the propulsion systems and vehicles and the design and fabrication approaches taken to produce them.

Award Brazing Contract

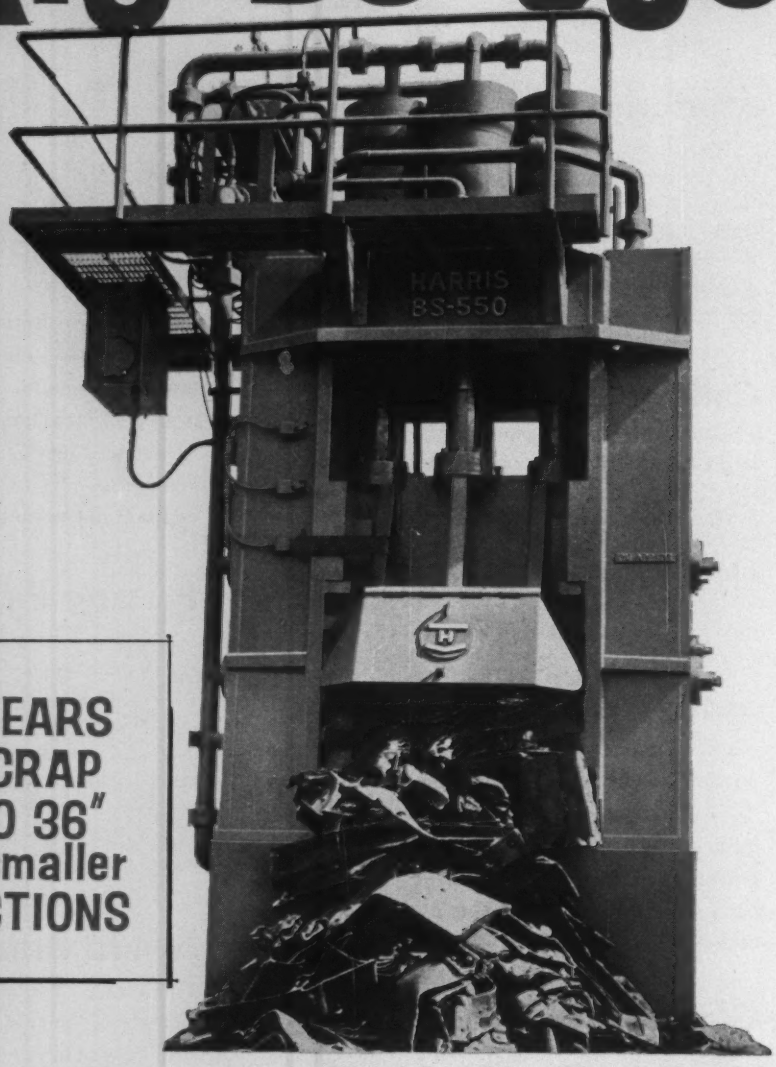
Contracts for making brazed, stainless-steel honeycomb panels for the expanded B-70 program are being awarded. Two of the recipients are Aeronco Mfg. Corp. and Ling-Temco Electronics, Inc. The amount of money involved was not disclosed. Funding for the program this fiscal year was recently beefed up from $110 million to $265 million.

Ceramic Coating Use Grows

Continuing research into ceramic coatings for metals shows many new design applications probable as temperature needs rise. One example is a coating of a few thousandths of an inch on turbine blades for high-speed jet engines. This coating is expected to solve many other design problems in missile and space equipment.

HARRIS BS-550

compresses auto bodies and no.2 heavy melt



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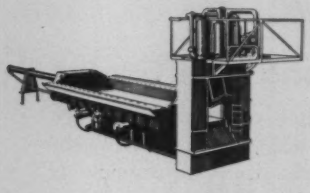

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- **The Harris BS-550 design eliminates 90% torch work. Assures fast loading, increased production.**
- **Rugged, hard-hitting, tough Harris Shears handle bulk fast; produce clean, furnace-ready no. 2 and foundry-grade material.**
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Special Machining Methods

■ Since Sputnik, the metalworking industry has suddenly geared up to advance on a host of new problems. Not too long ago, most of these problems were purely academic.

Today, national survival depends on how soon they can be solved. Your own company's future may also be challenged by this surge of developments.

Some of the knottiest barriers lie in the area of machining. For instance, how do you cut, shape or even drill tungsten, molybdenum and cobalt-base alloys? How do you form complex shapes from cermets? For that matter, stainless, titanium, zirconium, and the new alloys of aluminum and beryllium also pose special machining problems.

Far from being academic, these frontiers pose a threat of new unknowns for all who expect to succeed in metalworking in the next decade. What happens in aerospace, nuclear and electronic fields can't be quarantined. It has a way of being translated overnight into more general areas.

As a result of new material developments, special machining processes are finding more jobs.

How to Get More For Your Metalworking Dollar

No. 6 of a series

Special machining methods is the subject for this feature, the sixth in The Iron Age's 1960 Metalworking Dollar Series.

Other features included:

1. March 3: Cutting Fluids
2. April 14: Numerical Controls
3. June 30: Metallic Coatings
4. August 25: Special Fasteners
5. October 6: High-Strength Steels

New Processes Challenge Old

Metalworking changes are piling up at a bewildering rate.

You've heard about new machining processes. Is there a place for them in your plant?

By **R. H. Eshelman,**
Machinery Editor

■ In every area of metalworking, materials are getting harder to machine. Many of today's products contain materials that were only names in textbooks a few years ago. Tomorrow promises more changes.

New materials and new product-design concepts are the fall-out from rapidly accelerating scientific programs. But they prove a growing headache for production men. No longer can you be sure your old machining methods will work.

Even if the old methods work today, things may be different tomorrow. That's why it pays to look closely at special machining methods.

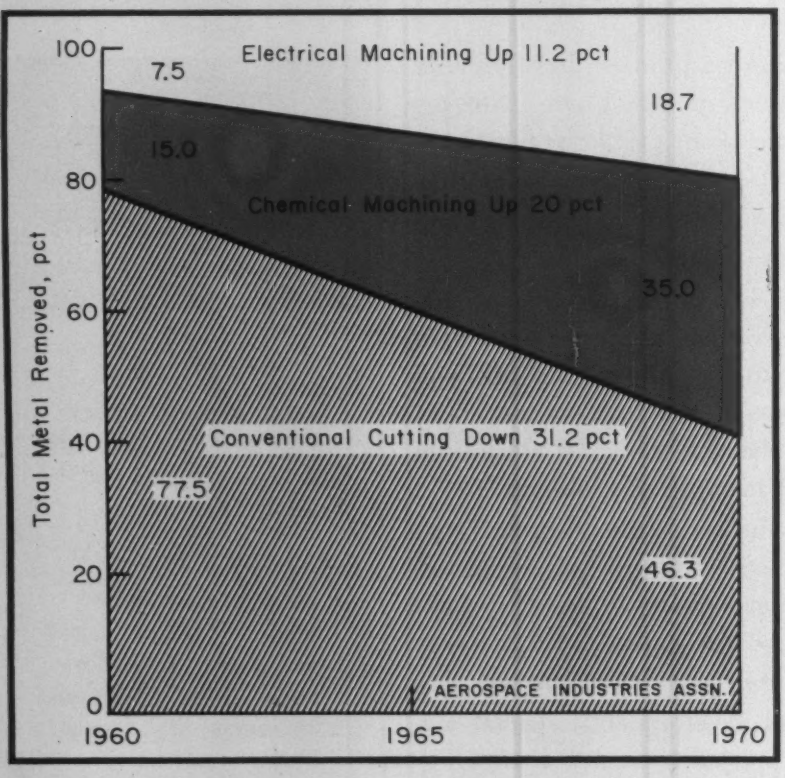
Natural Limits — Conventional machining centers on a tool in motion on a workpiece. This makes chips. The faster the better. However, shear-plane cutting has obvious and natural limitations. Since the tool operates in two planes, a series of cuts must be taken to obtain the third dimension.

These limitations don't hold true for many of the newer processes. The newcomers include: mechanical abrasion or ultrasonics; electrical discharges or electro-chemical effects; heat with a variety of torches; and chemicals for etching or eroding away material. Many of these processes operate in three dimensions at the same time.

Another basic advantage of most special machining methods is freedom from thermal damage. This factor must be guarded against in chip removal.

Recognize at the outset that the new processes are in various stages of development. Some already serve in metalworking shops. Others, having shown their value in prototype setups, are striving for more widespread recognition. Still others haven't burst out of their experimental cocoons.

Machining Trend Shapes Up



Technology Stretches — When you look at today's end products you begin to realize how materials engineering and metallurgy have advanced in the past 10 years. Every day, design becomes more and more scientific. It's moving closer to ultimate material capabilities in most areas. From automobiles to washers and from axles to pressure vessels, excess weight is on the way out.

In a missile, the reliability of 300,000 parts must approach 100 pct. This same concept of higher levels of quality and reliability is taking hold in appliances and autos. Engineering and design continue to stretch the limits of technology in other fields. They even push out the boundaries, when necessary.

Wide Choice—Along with the tool-and-die steels, stainless and the hard alloys, you now have to consider the refractory-metal alloys. These alloys are molybdenum, columbium, tantalum and tungsten.

Also, there are combinations

which include: cermets, ceramics, truss - core materials, laminates, powder - metallurgy parts, honeycomb, and bonded, brazed, welded and clad metals.

Heterogeneous alloys, plastics and ultra-thin sheet add to the flood of machining problems, Titanium, beryllium, aluminum and magnesium alloys also find more and more potential uses.

Manufacturing Lags—The conclusion of leading engineers, researchers and far-sighted executives is that manufacturing methods may be falling behind. Design moves ahead so fast that more effort is needed to keep production abreast.

Researchers predict that metalworking faces growing demands in three areas: higher accuracies, greater versatility and increased productivity. Of course, there's plenty of room for conventional machining to advance in all three areas. No doubt, chip removal will for a long time remain the workhorse of the metalworking industry.

In the newer fields on the other hand, special machining continues to fill an ever-growing role. According to a recent composite opinion of its top people, the aerospace industry predicts a trend away from conventional machining methods.

Trend Begins — Electrical- and chemical - machining methods are singled out for special consideration. Many metals and most of the ceramics and cermits require special machining methods.

Chemical milling may develop as a finish process to remove excess weight from structures made from high-strength materials. The chip-machining methods now used on aluminum will prove inadequate for this task.

Among the problems cited in the survey are those of contouring complex, tapered surfaces in honeycomb and other core materials.

By 1970, such operations will demand tolerances of 0.001-0.002 in. in 25 pct of the cases. In 50 pct of the aerospace parts, tolerances will be held within 0.002-0.005 in.

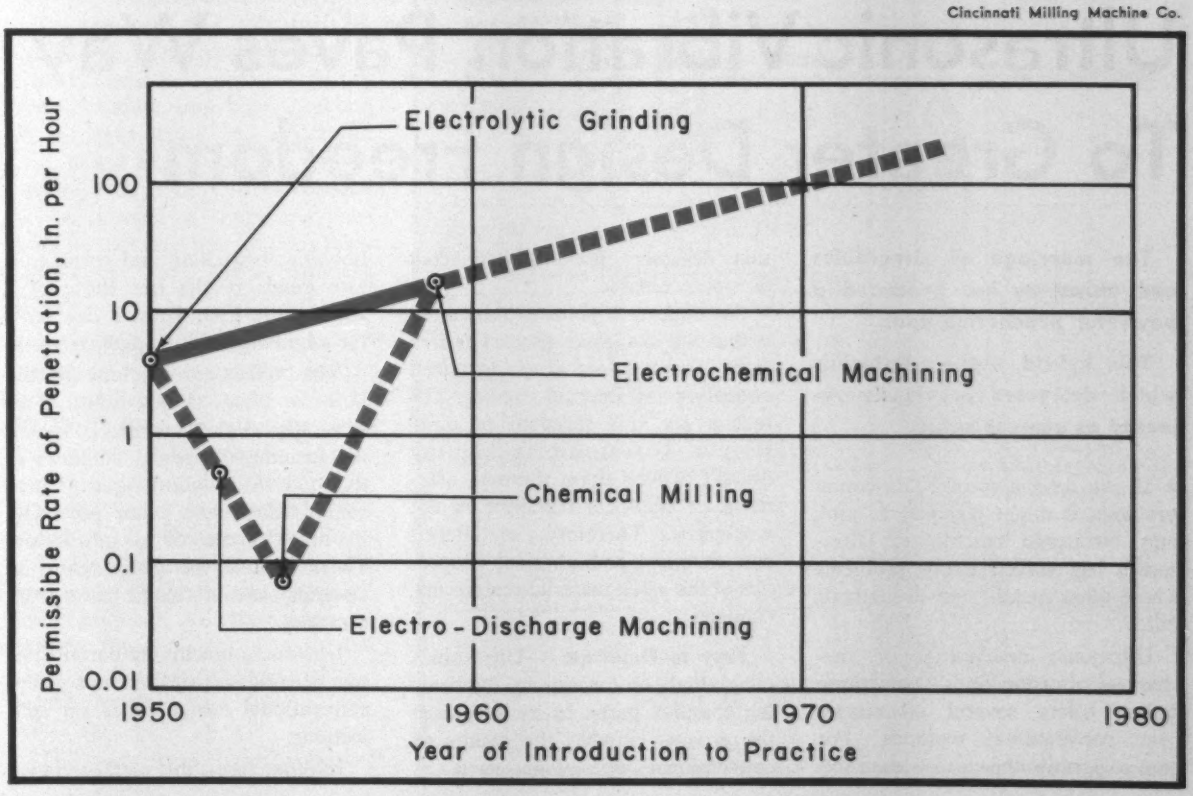
Look Ahead—Industrial leaders confirm the development of tools and equipment for electrical metal processes is moving ahead at a rapid pace. Limitations of the past are overcome as new equipment comes off the design board.

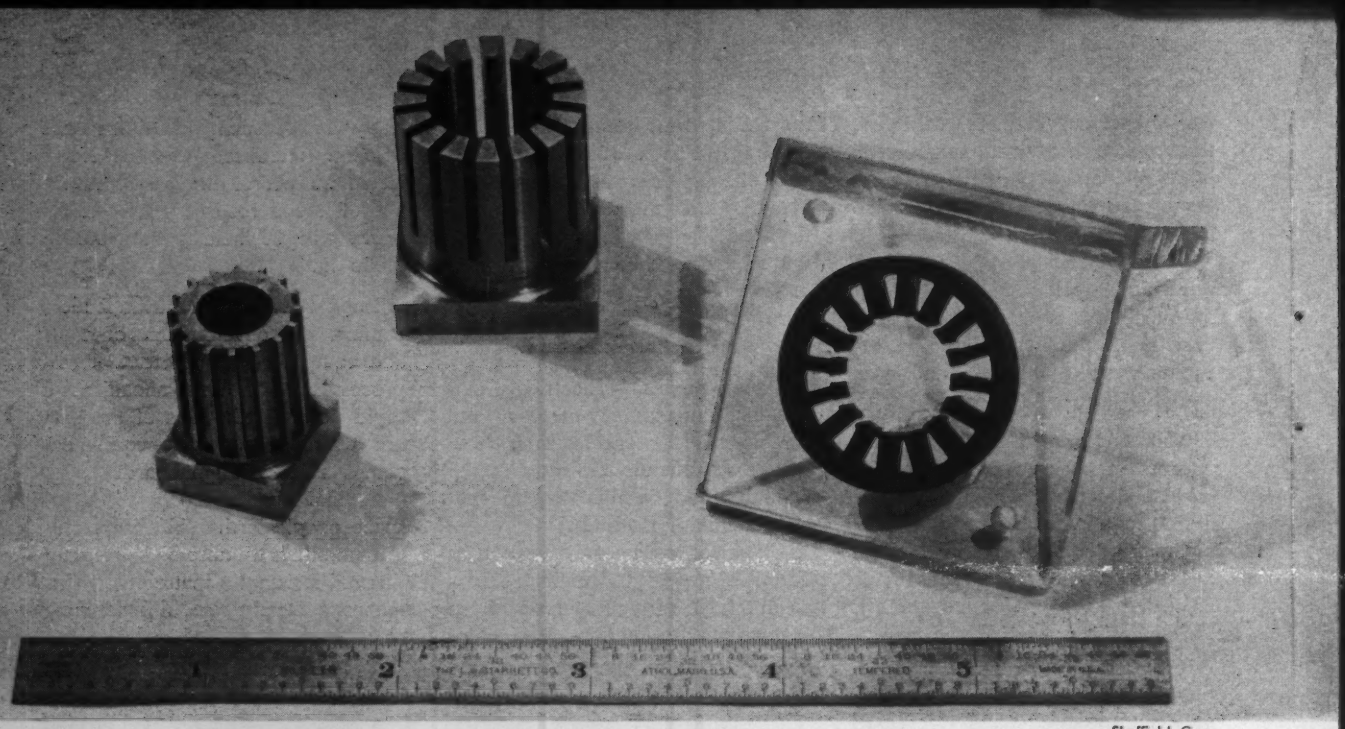
A final trend noted by the aerospace people is the shift from aluminum alloys to more high-strength, thermal-resistant materials. This means a steady rise in machining costs.

There are two trends underway. One is the changing materials proportions. The other revolves around the high cost of metal removal. Several special-machining factors may help to counter the rising cost of working harder materials.

Metal-Removal Rates Continue to Improve

Cincinnati Milling Machine Co.





Sheffield Corp.

TOOLS AND PART: At left is a tool that machines slots on inside diameters. Center tool handles larger slots on ferrite motor laminators. Concentricity of part is within 0.002 in. on inner and outer diameters.

Ultrasonic Vibration Paves Way To Greater Design Freedom

The marriage of ultrasonics and abrasives has produced a powerful production tool.

This hybrid shapes materials which designers previously rejected as unmachinable.

▪ If you have a special fabrication problem, it might pay you to look into ultrasonic machining. Ultrasonics has solved many problems where other metal-removal methods failed.

Ultrasonic machining, or mechanical abrasion as it's sometimes called, offers several advantages over conventional methods. For one, it permits the use of materials that designers previously rejected as unmachinable.

An important point to remember is that the ultrasonic process is free from thermal cracking, localized annealing and internal stresses. The reason for this freedom is quite simple. Ultrasonic machining doesn't depend upon thermal, electrical or chemical reactions in the workpiece. Therefore, metallurgical, chemical and physical properties of the work material remain unchanged.

Easy to Duplicate — Ultrasonics offers high uniformity in duplicating complex parts. In its own way, the process matches the results of conventional operations such as hobbing, broaching and coining. It also yields results like those of a single-point tool. Thus, it can serve for engraving and die-sinking work.

The process can machine tapered holes or blind, curved holes of almost any desired shape. It speeds the forming of special contours at the bottom of blind holes. Ultrasonics also boasts other potentials in many areas of metalworking. These include the manufacture of electrical and electronic parts from ceramics.

Ultrasonic machining permits design of solid sections in cases where conventional design relies on split sections.

In other cases, this metal-removal

method reduces machining time by forming profiles on metals that are in the hardened state. As a result, it precludes hand polishing. End result is close tolerances and fine finishes. For example, ultrasonics salvages dies and other tooling without annealing.

Not Dangerous—The actual machining process is safe. Why? Because the cutting tool is harmless to anything that's resilient. An operator can even touch the reciprocating tool without injury or pain.

Another nice feature is the fact that semi-skilled workers turn out precision work with the process. Setups are economical. Tools can be shaped from inexpensive materials.

Basic principle of the machining action is a physical one: Power transfers through a metal punch to a hard abrasive. This action makes cavities in materials that are harder than the tool tip. Vibration of the tool, at frequencies above the sonic range, drives the abrasive particles into the workpiece at a rapid rate. Enough force is exerted to give a practical machining operation.

To promote tool vibration an electro - physical phenomenon is used. It's called magnetostrictive action. Actually, this action centers on the contraction and expansion of a nickel core in an alternating-current coil. This transformer-like device, termed a transducer, imparts oscillating linear motion which accelerates the tool's abrasive grains.

Arrangement Is Important — In ultrasonic machining the cutting tool oscillates between 20,000-30,000 times a second in the abrasive slurry. This yields a rubber-band action, illustrated in the diagram, which is produced by a sound - wave, energy - transmission line. The line consists of the tool, connecting body, and magnetostrictive transducer. All these parts, including the tool, go through the same contraction-expansion action. Stroke length varies from 0.001-0.005 in.

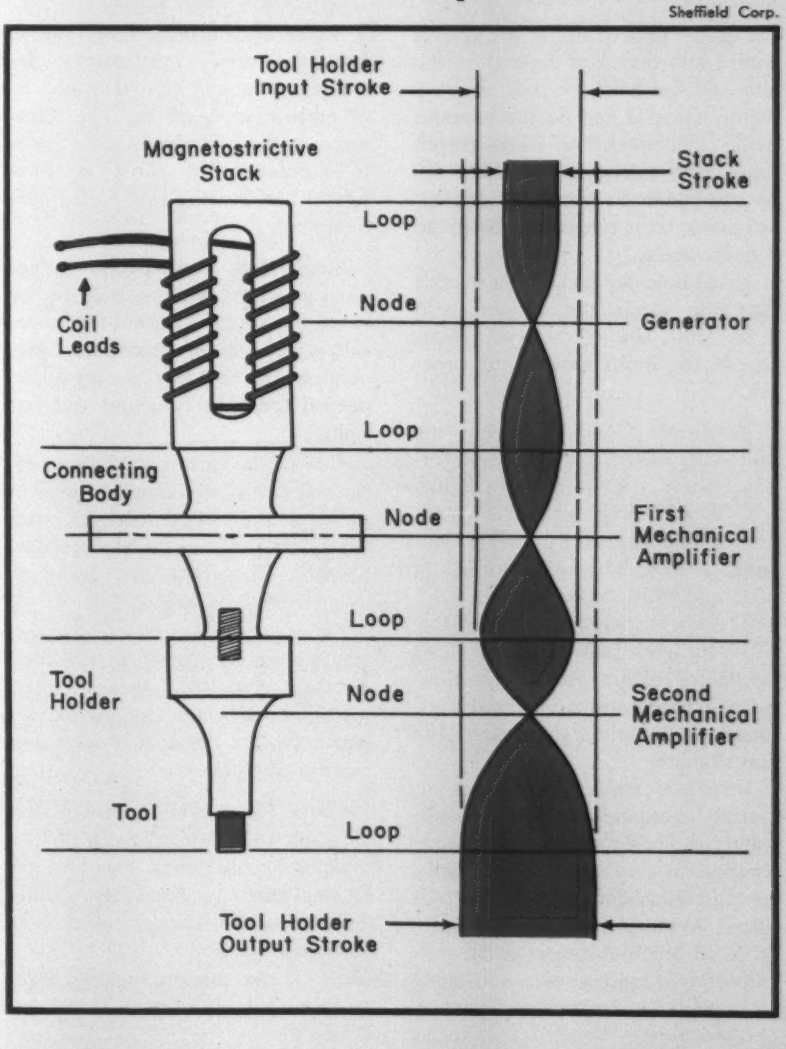
The tool's form is the reverse of

Sheffield Corp.

PRECISE WORK: Oscillating abrasives cut ports in the sleeves of hydraulic servo valves. An abrasive slurry covers the part being machined.

Transducer Amplifies Stroke

Sheffield Corp.



Shape Really Tough Materials

Material	Ratio of Stock Removed To Tool Wear*	Max Practical Grinding Area, sq in.	Average Grinding Rate, ipm**
Tool Steel	1:1	0.875	0.005
Tungsten Carbide	1.5:1	1.2	0.010
Boron Carbide	2:1	0.875	0.008
Quartz	50:1	3.0	0.065
Ceramic	75:1	3.0	0.060
Carbon Graphite	100:1	3.0	0.080
Ferrite	100:1	3.5	0.125
Glass	100:1	4.0	0.150
Glass-Bonded Mica	100:1	3.5	0.125
Germanium	100:1	3.5	0.085

* Cold-rolled steel cutting tool with 320-grit boron-carbide abrasive.
** Using ½-in. diam tool, grinding to ½ in. depth.

Raytheon Mfg. Co.

the design desired in the workpiece. Finish and precision depend on the size and finish of the tool, fineness of the abrasive and on the material being machined. A 10-microinch finish with tolerances of 0.005 in. or better can be obtained. Typical ultrasonic tools range from 3/16- to 3½-in. diam.

Usual hole depths are 1½ in. But cuts with special tooling can go to 5 in. Thus, size of the tool creates one of the limitations of the process.

Electronic Use—At present the main user of the ultrasonic machining process is the electronics industry. Typical jobs include drilling, cutting and engraving complex designs, shapes, holes and cavities in hard and brittle materials.

These materials are carbides, ferrites, molybdenum disilicate, lead zirconate, calcium and lithium fluorides, magnesium-oxide refractories, tungsten, zirconium oxide and barium titanate.

Industrial applications hinge on cutting germanium and silicon wafers and other semiconductor materials into tiny disks. These disks serve in transistors, diodes and rectifiers. Another tough job that pays off handsomely for users is the machining of round, square and complex shapes in hydraulic sleeves.

Sensitive control of flow rates in hydraulic servo mechanisms depends on holes or slots that may be as narrow as 0.002 in. The ultrasonic method produces these holes in stainless steel parts, or even 52100 tool-bearing steel, after heat treatment.

Single-Unit Construction — Previously some designs had to be made in several sections. As a result, costly and time-consuming machining or grinding setups were needed for both roughing and finishing.

One of the extra payoffs with ultrasonics is elimination of burrs in such critical work. Sleeves with more complex port profiles are now possible. These parts can't be made by split-section design.

Other profitable uses include machining carbide dies, inserts and sections. This also means major savings in die-modification and repair costs. An example is wire- and bar-drawing dies.

Costs Tumble—Formerly a carbide nib was sintered to a slightly undersize profile form, then brought to final size by diamond lapping. This called for special taper tools and high operator skills. Ultrasonically, the job is done in a fraction of the former time.

An interesting and unusual application is making tread-form cavities in plaster-tire molds. Previously these were tedious, time-consuming operations that depended on human skill. Uniformity and alignment grew more difficult with increasing complexity of tread design. Molds were often chipped.

Ultrasonic machining uses only water as the abrasive on the plaster molds. Result: Operations are more rapid, simple and accurate.

Tooling Up—Tooling for the ultrasonic process resembles hobbing setups. Shape of the desired section determines size and shape of the tool form. For complex jobs, tooling methods can be borrowed from other processes. For instance, tools can be designed for rough, semi-finish and finish work to suit tolerance needs.

Finish on final-operation tools bears an important relationship to results. The toughness of the tool material influences its wear resistance.

Tool materials are metals, commonly used in annealed form. This eliminates heat - treat - distortion problems. Preferred materials are tough steels, stainless or tool types.

Tool shapes do not require relief angles as for other metalworking operations. Stock removal rates prove that the harder the substance, and the more brittle, the faster the cutting rate.

Each tool can be fastened to its holder by brazing. Or if desired, it may be held by mechanical means. Tool holders thread into the transducers.

Developments Ahead—Work is now underway to check the effects of high-frequency vibrations on grinding high-strength, thermal-resistant alloys with conventional grinders. In production setups, big savings are possible with multi-station ultrasonic equipment. This equipment is being introduced for dicing semiconductors and similar high-production jobs.

Fully-automated ultrasonic units, with automatic loading and unloading, are also reported on the way.

Have You Considered All Forms Of Electrical Machining?

Although based on well-known physical laws, electro-machining methods are fairly new.

In some fields these methods offer spectacular advantages.

■ All forms of machining depend on an expenditure of energy. For most metal-forming processes, mechanical energy is used. This causes plastic deformation in the work material.

With electro machining, on the other hand, electrical energy is expanded. One form of electro machining is electro-discharge machining (EDM). It uses a high-density current to blast craters in a workpiece. These craters are the reverse of the tool electrode's image.

Future in Question—The present and future status of all electro processes depends on the cost of the electrical energy used. It also hinges on stock-removal rates and metallurgical factors.

Tungsten, molybdenum, titanium, beryllium, and in fact almost any conductive material may be successfully machined. Using these "cold" processes, you can remove metal from hardened workpieces without distortion.

Even the fragile new materials such as honeycomb and other sandwich structures, can be machined with precision and little waste.

Three Types—Actually there are three different electro-machining processes that fall under the same general heading. The first uses a spark discharge from a tool. This discharge passes through a fluid dielectric to the work. The electro discharge blasts a crater in the workpiece.

Since the crater is the reverse image of the tool's electrode, it's possible to obtain holes and cavities that are almost unlimited in shape. Major applications to date are in the die field.

Electrolytic grinding is sometimes confused with the previously-described electro-discharge-machining method. However, in electrolytic grinding, the abrasive of the metal-bonded grinding wheel establishes the working gap for the electrolyte between the work and the wheel.

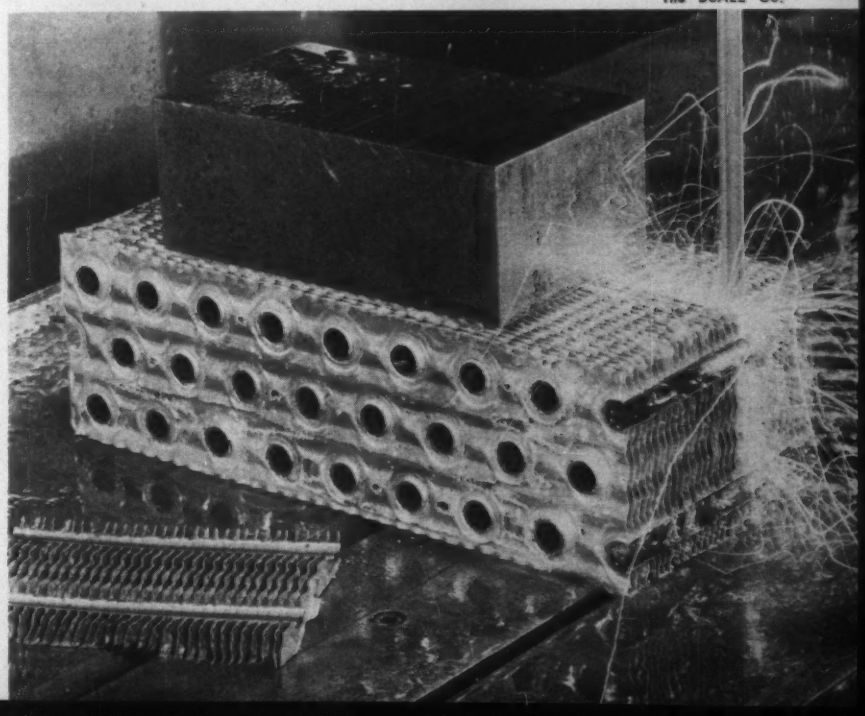
Many Forms—Only 10 pct of the stock is removed by abrasive cutting. The balance of the metal is altered by electro-chemical decomposition of the workpiece. This method can be used in plunge, surface, traverse, cylindrical, internal and form grinding.

Special arrangements of electrolytic spindles serve on a variety of other machines. These include planers, beam mills and boring mills. Most are used for electrolytically machining honeycomb.

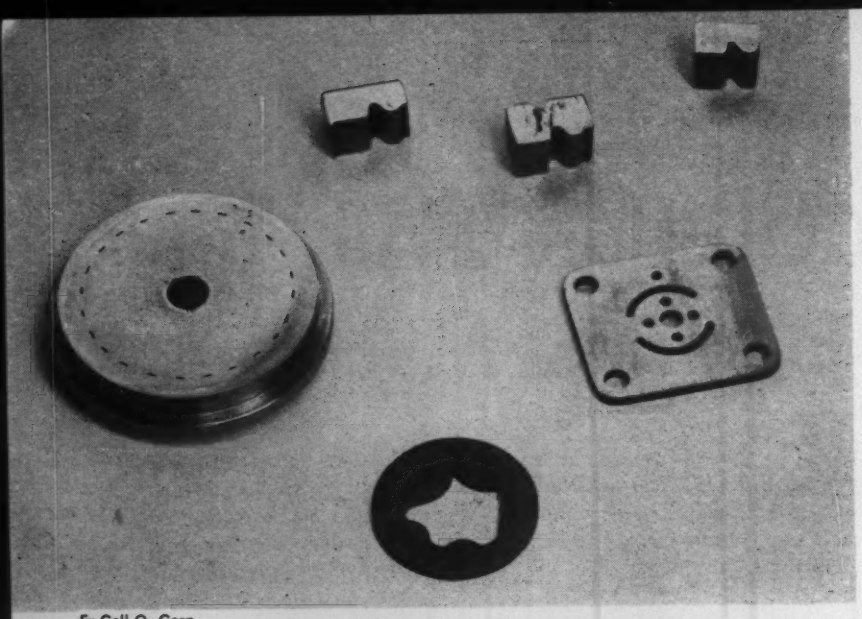
Recently introduced is a third electro-machining process. This newcomer is used for electro band-sawing honeycomb and other fragile cellular structures of metal foil and thin-wall tubing.

In this setup, using a toothless band on the saw, cutting rates depend on a low-voltage, high-current power supply. This power sustains an arc on the leading edge

The DoALL Co.



BURR FREE: Quenched arc cuts through a heat-exchanger core of thin-wall copper with aluminum-foil fins at 50 sq in. per minute.



Ex-Cell-O Corp.

TYPICAL PARTS: Carbide dies, blade roots and other hard workpieces are machined with little difficulty by spark-discharge methods.

of the band. A flood of water limits or quenches the arc so that with all factors in balance, the finish equals that obtained by grinding.

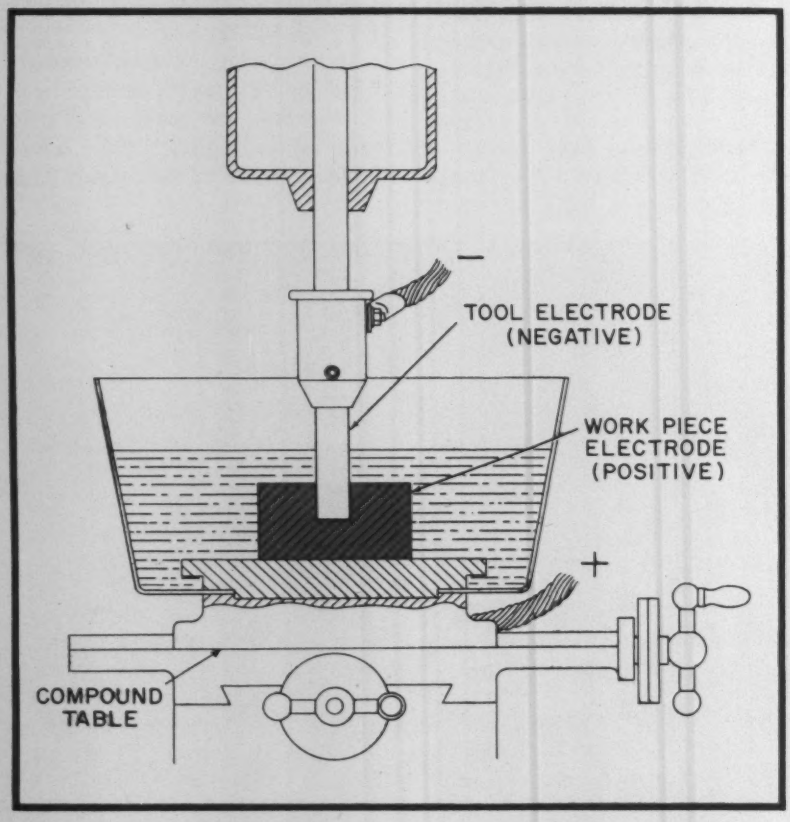
Fast Work — Cutting rates for finish work are 5-50 sq in. per minute. When finish of the foil edge isn't important, you can go to 200 sq in. per minute. Flatness of the surface produced by the fluid-arc sawing process ranges from ±0.003-in. TIR (total indicator reading) at the lower speeds, to ±1/64 in. at the top rate.

Power-feed tables are used because hand feeding is impractical. Since actual cutting is done by an electric arc, neither the work nor the cutting band are subject to the stresses that occur in sawing, grinding and milling. Fixturing is simple. All you need to do is hold the work in position so that it doesn't deflect under its own weight.

The coolant's function is to localize heating of the work to the minute portion that's being cut at any moment. This prevents metallurgical changes. It also carries away swarf, leaving a clean, burr-free surface.

Current Flow Dissolves Metal

Ex-Cell-O Corp.



Some Limitations—Several automotive plants have recently installed electro-discharge machines in their die shops. Main uses are for forging dies. Where many repetitive dies must be made, and reworked, the EDM process shows substantial cost savings. It also boosts quality control.

The matte finish left on the die by EDM is satisfactory for most forging and presswork needs. However, when a polished finish is desired, it can be added by a secondary vapor honing or other superfinishing method.

In general, the limitation in this field of use has been the fairly slow rate of metal removal compared to Kellering. Another limitation depends upon the wear on the tool electrode.

Rapid Development — Work is being done, both here and abroad, on these problems. Some European machines are claimed to handle up to a 400-cu mm per minute hogging rates. These machines use high-output generators.

Russian equipment, recently exhibited in New York, boasts even higher potentials. However, the

newest American machines are expected to equal or better any demonstrated performance of foreign equipment.

Tool Grinding—The electrolytic grinding process, has found a number of areas where its advantages are outstanding. One of these is in carbide-tool grinding. Success in this field is due to several features.

Among these are low rate of diamond-wheel wear, fine surface finish, increased tool life, fast metal removal and the elimination of heat checks and cracks. Other advantages include simultaneous grinding of steel shank and carbide insert, and one pass grinding of chip breakers.

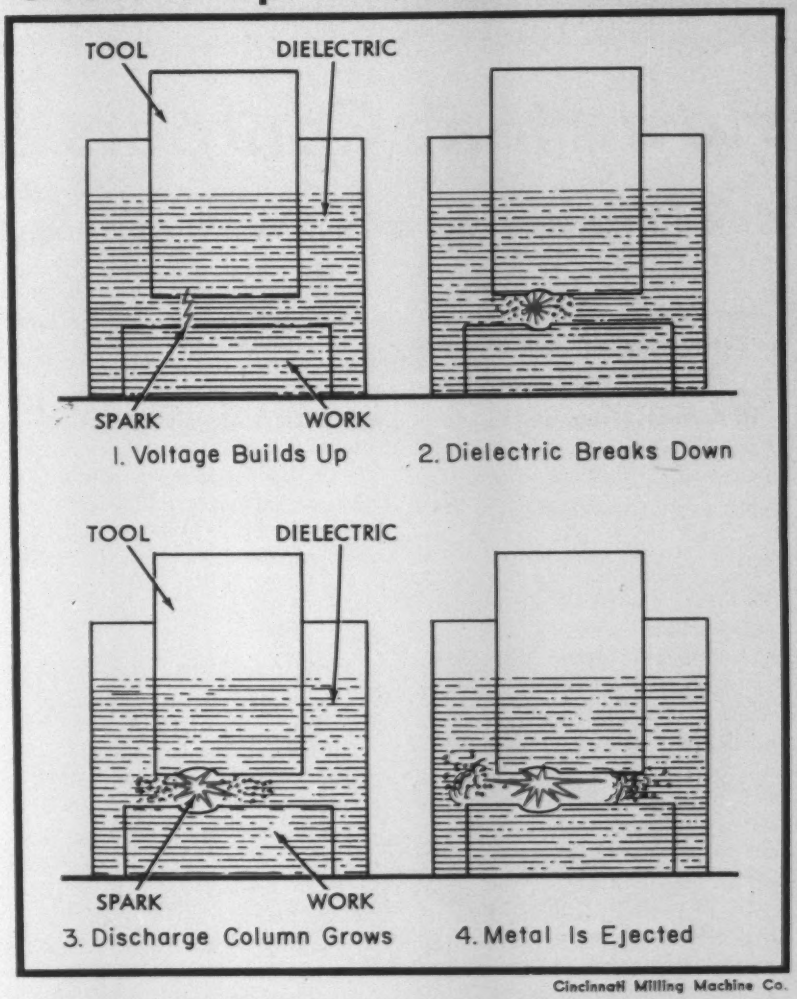
Recently, electrolytic grinding has been refined for sharpening of milling cutters and throw-away inserts. Cost of the latter job is generally under 20¢. In some setups this cost may be about 10¢. For inserts running from $1.50 to over $3.00, the savings becomes spectacular when large numbers of tools are used.

Other Uses—Experimental work with this process forecasts success in both internal- and external-cylindrical grinding. It's expected that electrolytic cylindrical grinding will soon be applied on a production basis.

Other electrolytic-production applications solve problems that are inherent in conventional machining tools. Most of the problems arise from development of newer, tougher, harder-to-machine alloys. Electro machining is no cure-all. It can't solve all such problems. Conventional machining methods that produce chips will frequently remove stock faster. This is especially true on alloys softer than Rc 40.

However, stock removal rates become less important when the heat sensitivity of an alloy causes distortion, metallurgical transformation, checking and cracking. Metal-cutting also leaves burrs and surface-metal smears. Electrolytic grinding promises an answer to these difficulties.

Check Steps in Metal Removal



Cincinnati Milling Machine Co.

Eliminate Friction—Consider the machining of stainless and aluminum honeycomb. Prior to the use of electro methods it was almost impossible to machine honeycomb without producing burrs.

Machining and grinding metals such as molybdenum also present formidable barriers due to heat sensitivity. Warpage, from slow stress relief after grinding, was difficult to overcome until electrolytic processes were born. Now, the grinding of thin stainless sheets is done without the usual after effects of curling and warping.

Widens Field — Grinding of through-hardened and case-hardened steels by electrolytic processes is a must when surface-fatigue resistance of the finished product is important. One recent research program proved that electrolytic grinding improves surface-fatigue resistance by as much as 30 pct.

Perhaps one of the most promising uses for electrolytic machining is form grinding. Recent installations have successfully formed grind-root sections on turbine blades from solid stock in less than a minute. This eliminates several machining steps. A form-cathode wheel, consisting of aluminum-oxide grain in a metal bond, is used.

Electro machining is still maturing. Difficulties will be encountered. More research and development are needed. But as its horizons widen, its true role will be recognized by the metalworking industry.

How Heat Contours Metals

New Processes Make Fast Work of Short Runs

Metals and alloys that can't be cut by conventional methods are becoming familiar problems.

High heat yields one answer. It's available in three major forms: tungsten arc, electron beam and plasma-jet flame.

■ In the fabrication of many products there's a need for contour cutting or shaping blanks. Usually this need crops up on short work runs.

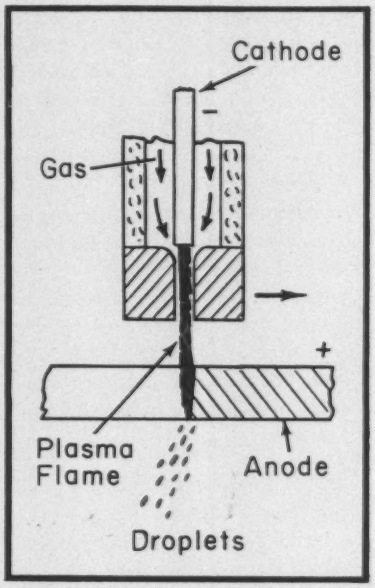
Conventional means of handling these low-volume jobs include band and friction sawing, powder cutting, routing and nibbling. The main merit of all these fabrication methods is the wide variety of work that's handled with simple, low-cost tooling.

But as materials grow harder and more varied, and as part shapes get more complex, new processes are called for. You can no longer afford the time, expense and large tolerances that are inherent with hand methods. That's why the advantages of high heat in contour cutting promise to fill a gap in most jobbing shops.

Tungsten Arc—The tungsten arc pays off in many areas within these shops. It serves as a really-adaptable, special tooling method. Also, look for the electron beam and plasma jet to fill more special roles in future machining work. Their capabilities are becoming more well known as equipment to use them develops.

When introduced to industry in 1955, constricted tungsten-arc cutting (known as the Heliarc process) was applicable only to aluminum. Since then, this limitation has been lifted. The process has also been improved to handle thicker materials.

Now, stainless, as well as aluminum, magnesium and copper can be cut either with a manual torch or mechanized shape-cutting setups. Advantages in cutting plate stock by these methods are: minimum carbide precipitation, without iron-powder or other contamination; unchanged machinability and magnetic permeability; close tolerances; and the elimination of distortion and discoloration.



ASTME

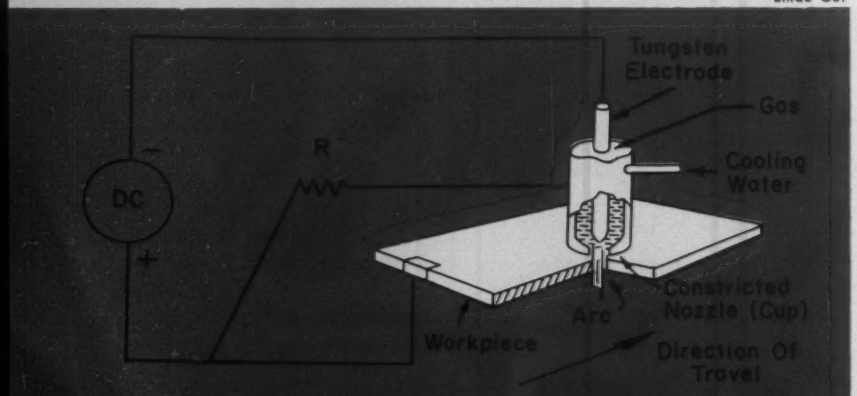
HIGH HEAT: At 50,000°F, a plasma jet vaporizes tough metals.

Reduce Processing Time—Stainless parts are very often used right after tungsten-arc cutting. Savings on large disks, rings and other pieces are substantial. One metal-service center reports savings of $25-30 per part on stainless gear blanks. An even larger payoff can be expected from the elimination of machining, annealing and other processing of the cut, prior to welding.

Tungsten-arc cutting uses a constricted arc between a tungsten electrode and the workpiece. It also makes use of a high-velocity gas stream. The arc is concentrated and localized upon a small working

Tungsten Arc Gives Clean Cut

Linde Co.



area. Its intense heat, about 28,000°F, melts the metal.

The gas, which is preheated by the arc, expands. This gas is forced through a constricting orifice. Usual gas mixture consists of 35-pct hydrogen and 65-pct argon.

Gas Protects Part—Molten metal, removed by the jet action of the gas stream, forms a kerf. The cutting gas protects the walls of the cut from oxidation. Heat and force of the arc's stream combine to yield a high-quality, saw-like cut. Generally all cuts are free of dross.

One of the advantages of the tungsten arc is its fast cutting speed on heavy materials. With mechanized setups, speeds up to 1000 ipm on ¼-in. stock are claimed. A more common rate is 300 ipm.

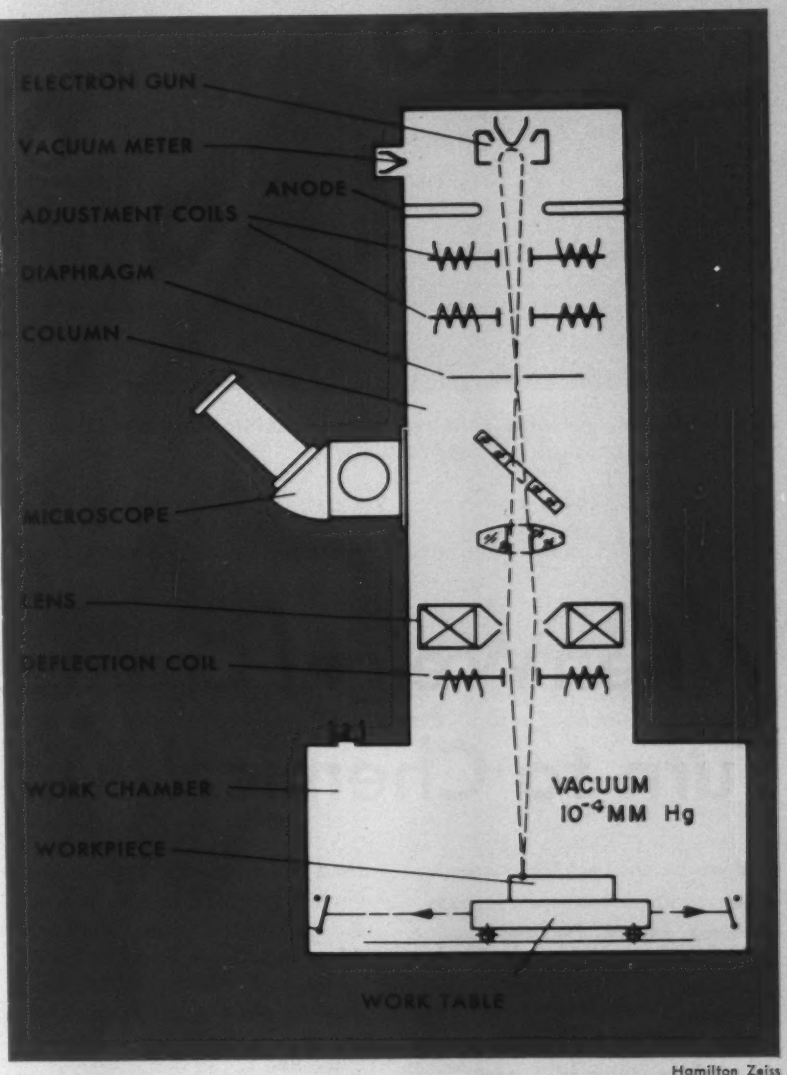
Maximum thickness of aluminum or magnesium for production cutting is 3 in. For stainless, 2 in. is practical. With thicker materials, such as aluminum beyond 1½ in. or stainless 1 in. thick, heavy duty setups are used. This calls for heavier gas flows and a greater power supply.

Cuts on thick plates may not be dross-free, nor as square as those obtained with thinner plates. Typical cutting rates for 3 in. thick aluminum are 20 ipm.

Electron-Beam Cutting—One of the really advanced processes, which has yet to be fully evaluated, is electron-beam cutting. The basic arrangement can be described as a modified electron-beam microscope. Heart of the machine is an electron optical column. This consists of an electron gun, adjusting device, magnetic focusing lens, stereo viewer, beam deflector and a work chamber with an adjustable table.

Adjustment coils direct the beam through the center of a magnetic lens. This focuses the beam to a fine spot on the work. When the beam hits the work surface, the high-velocity electrons give up their kinetic energy. This energy is transformed into high thermal energy which vaporizes the material. Deflection coils cause the beam to oscillate. Oscillation prevents overheating and distortion of the work.

Electron Beam Is Easy to Use



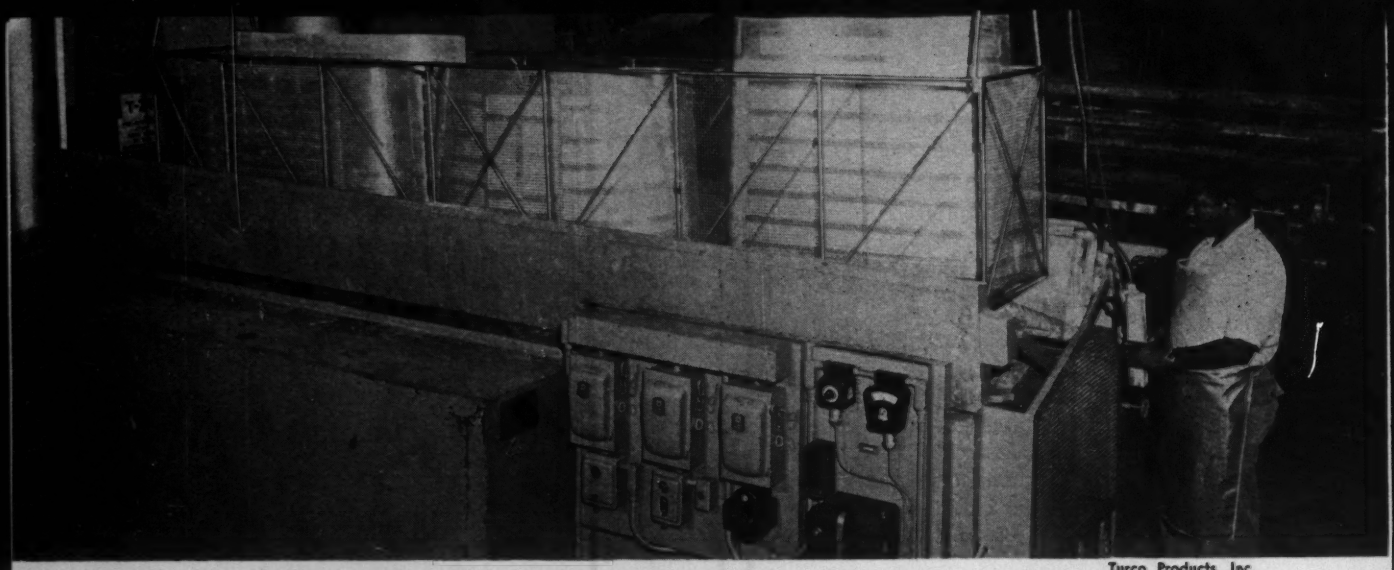
Hamilton Zeiss

Fine Control—Almost any material can be cut or drilled to small, complex shapes and close tolerances. Complex slots with overall dimensions of only a few thousandths of an inch, or holes as small as 0.0005-in. diam are produced to exacting tolerances.

The machine is versatile. The only limitations on the cutting profile and the operating speed are those imposed by the magnetic tape or other programming devices.

Plasma Jet—Plasma flame has been a laboratory curiosity for many years. Only recently has it been recognized for its potential as a metal-shaping tool. Essentially a plasma jet is an electric arc that's constructed by a gas to a superheated slender beam. No combustion is involved. When the gas is ionized, it constricts the beam further and thus raises the temperature.

Heats range as high as 50,000°F. When such a jet strikes even the most refractory of metals it vaporizes them almost instantaneously. It knifes through metal plates rapidly. And it leaves a cleaner cut than other flame-cutting methods.



Turco Products, Inc.

ETCHING DIP: Airframe parts are immersed in an acid bath. Depth of the etch depends upon immersion time.

When Weight Creates a Problem Turn to Chemical Milling

If you're looking for a way to shape complex contours in hard-to-reach areas, try the chemical-milling processes.

Chemical etching pares off excess weight while improving the surface finish of a part.

■ Removing unwanted metal by using a controlled chemical reaction is a simple, but relatively new, production process. No one seems to have seriously considered its many obvious advantages until the birth of the 1950's. Then the aircraft industry hit upon this method of paring off excess mass from aluminum wing skins and other airframe parts. It's been picking up support ever since.

In essence, chemical milling centers on the etching or dissolving away of metal areas that aren't protected by masks or guards. This offers design advantages for high-speed aircraft panels. There may be other appropriate uses in automotive, office-equipment, electronics and architectural-aluminum fields.

Chemical milling solves really tough production problems. However, it's essential that the process be selected at the design stage.

Note Advantages — Along with weight savings, chemical milling offers several other bonuses. It can be used to control surface finishes. By carefully regulating solvent heat, immersion time, chemical content of the solvent compounds, and composition of the solutions used in the process, you obtain etched surfaces with a fine degree of accuracy and consistency.

In addition, the chemical process permits tapering of plates or sheets. It even stretch forms parts. These two factors simplify the use of fasteners on sandwich panels.

Designers find chemical milling helps with welded design, particularly joints that connect heavy parts to thin skins. Raised "lands" on thin skins are produced by the process. This improves weld joints. Thicker lands also prove useful in improving bearing surfaces for honeycomb-sandwich fasteners.

Other Uses—As honeycomb construction has increased, methods have been devised for chemically milling deep-contour recesses. In some cases, savings in part costs are reported as high as 55 pct. Crushing, burring and other problems associated with cutting have vanished.

Even on thin sections, tests show that chemical etching doesn't alter physical properties. Now that suitable etchants have been developed for a wider range of materials, magnesium, steel, titanium and other alloys are being handled.

Surface finishes on castings can be improved to 40-100 rms for

magnesium. Titanium finishes vary from 15-80 rms.

Aluminum castings present more of a problem because of porosity and certain alloying elements. Development work is solving these difficulties. In fact, aluminum castings are now being milled in small batches.

Removes Scratches — Generally, sheet-stock surface finishes can't be improved, since each finished sheet has a surface finish varying from 12-60 rms. This finish depends on the alloy, depth of cut and the heat treat. Chemical milling removes small defects or scratches in magnesium, and to some extent in steel and titanium sheets.

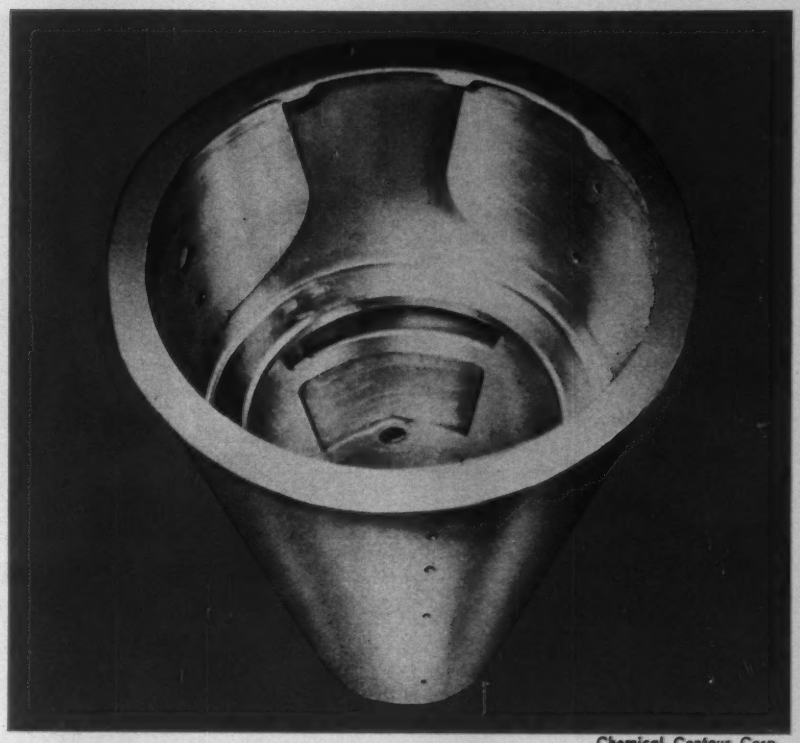
Tolerances are becoming tighter. Commercial work is commonly in the 0.005 in. range. But, excluding raw-stock tolerances, an aluminum sheet can be chemically milled to within 0.001 in., or less in regular production. With other alloys, variations run in the 0.002-0.005 in. range.

Even closer tolerances of a few hundred thousandths have been held in tests. Closer tolerances, of course, increase costs.

Process Improves — Four common steps handle most large parts. First, the part is cleaned for uniform adhesion of the masking material. This also insures uniform chemical action. Special care is taken on formed or forged pieces to remove die lubricants. The standard cleaning cycle includes solvent wipe or vapor degreasing, hot alkaline cleansing, rinsing and drying.

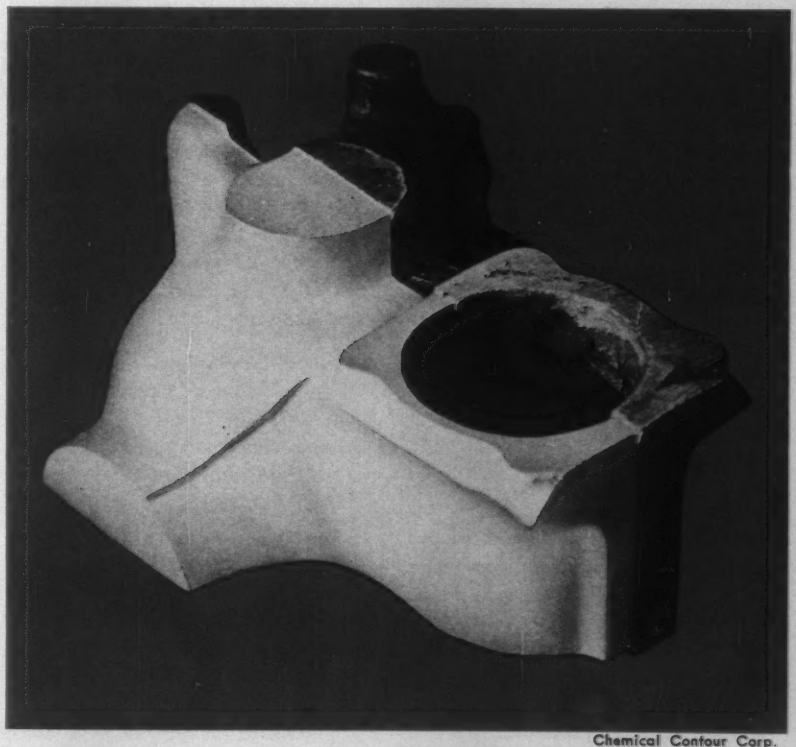
Next, the parts are masked. This is done by dipping, spraying, brushing or flow coating. The masking method depends on each part's size. Parts are then oven or air cured. The pattern of the area that's to be milled is scribed with a template. Then each scribed area is stripped from the part.

Immersion in a controlled acid-type solution etches the prepared parts. Depth of etch is fixed by immersion time. To insure uniform metal removal and good fillet radii,



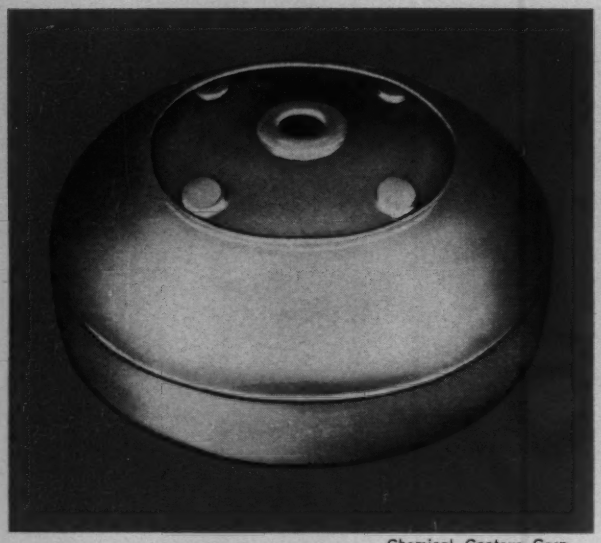
Chemical Contour Corp.

SOLVES TOUGH PROBLEM: Chemical etching forms complex partial cutouts on the inside of cone-shaped parts. It also improves surface finish.



Chemical Contour Corp.

MASK CONTROLS ETCHANT: Half of this forging has been finished by chemical milling. The other half was masked when the part was dipped.



Chemical Contour Corp.

IMPROVES WELDS: Chemical milling produces raised "lands" on thin sections to improve joints.

Turco Products, Inc.

EASY TO PREPARE: After the masked parts are scribed, all masks are peeled from the working area.

all parts rotate inside the bath.

A cold rinse, and then a hot rinse, after etching completes the cycle. Masking material is then removed either by hand or by chemical stripping.

Extend Use — From this basic process, developments are extending the scope of parts that can be successfully worked. Gang milling of a number of parts on a sheet, prior to separation, reduces costs quite a bit. Parts are cut apart after processing.

Etchants are being found for many of the high-temp alloys, including precipitation-hardened stainless, high-nickel types and others.

Even the exotic metals: molybdenum, beryllium, tungsten, zirconium and columbium are being investigated. These studies seem to indicate considerable promise.

Photomasking Possible — Although equipment and handling are simple, the masking process is a subject of constant research. Manual methods prove too costly for anything but small lots. Recently a new masking method has been devised. It will virtually eliminate the manual-scribing operation.

The new method uses a photosensitive mask. The proper areas are exposed and then rinsed away. Up to now this method has served for shallow and medium cuts. It's most desirable where complex parts are involved.

Another possibility being checked out is the silk-screen process. Electrostatic spraying of masks is still another cost-saving step. These sprays give a smoother film which precludes pinholes and waste. End result is a heavier coat.

To reduce deep scratches from scribe marks, other new ideas are being tried. One is a hot-knife technique which melts the mask. A soldering iron with a special tip has also been used to reduce marring of soft metals.

Some Limitations—Before specifying chemical milling, the designer should check to make sure his application is appropriate. There are certain limitations that must be respected.

For instance, fillet radii are influenced by the depth of cut, alloy, etchant and masking method. Radii are approximately equal to the depth of cut. Inside corners tend to take a spherical shape. Outside corners remain sharp.

Chemical etching over a weld often causes pits and uneven etching. Surface irregularities such as dents and scratches are reproduced in the chemically-milled workpiece.

Special Place—Some operations can't be handled by the regular tank-type dip. However, a new unit sprays chemicals on such parts in a continuous covering. This spray or splash controls corner radii to close tolerances. It can also blank out parts or handle complex shapes, such as narrow, curved channels, that require a very small etch factor. The chemical process is no magic cure-all. Nor is it a substitute for conventional machining. Instead, it's an added metalworking tool with its own characteristics.

Aluminum represents the largest share of work performed to date. But missile parts are coming in strong as a current area for chemical milling. Recently the electronics industry has discovered advantages for many new designs.

Because one of the outstanding assets of the process is the inherent ability to remove weight in a controlled manner, while holding strict structural tolerances, weight removal proves a prime reason for its use by the electronics industry. With a variety of steels now being chemically milled, there are indications that chemical milling will receive wider attention by the ferrous-metals industry.

Each New Process Fills a Gap

When you choose a machining process to do a specific job, there are many factors to consider. Usually, economic details are the most compelling.

With labor and capital costs still rising, special methods can pay off on many jobs.

■ When you look at such diverse metal-removal processes as chemical milling, ultrasonic cutting, electro machining and high-heat shaping, the question arises: What do they have in common?

All are, of course, new to the production floor. Their operation depends on principles that are new to most plant personnel. But in the long run, these facts may be less important than what the new processes can deliver.

As tool, process and manufacturing engineers become more familiar with these facts, the special processes are bound to find their proper place in metalworking plants.

Out Front—At present the aerospace and electronics industries are in greatest need of new methods. In areas of high and low temperatures, measured in thousands of degrees, new design concepts and new materials are acknowledged necessities. Other needs center on areas of miniaturization and micro-miniaturization.

In these rapidly-changing frontiers, conventional methods of removing, cutting and shaping material often just won't do the job. Therefore, we must call on special methods to fill these gaps. As these new methods develop and improve, they find paying jobs in many other metalworking areas.

Tools and Dies—An example lies in the tool and die field. Traditionally, this has been a hand-craft field where manual skill counts heavily. Now, electro - discharge machining has proved it can make complex dies faster, cheaper and better. This is especially true of carbide types when a number of dies are needed for the same job.

In forging dies you can even get a closer, more repetitious cavity. Since there's less variation in parts, you can afford to rework the dies oftener. Although there are size limitations at present, programs are underway to adapt this process to large cavities, such as those needed for auto-body dies.

Electrolytic grinding and shaping result in stress-free surfaces. This is very important when you're faced with a job dealing with tough metals that may be damaged by heat-producing methods. Also, large parts can be machined or shaped by these methods, with little wear on the electrode.

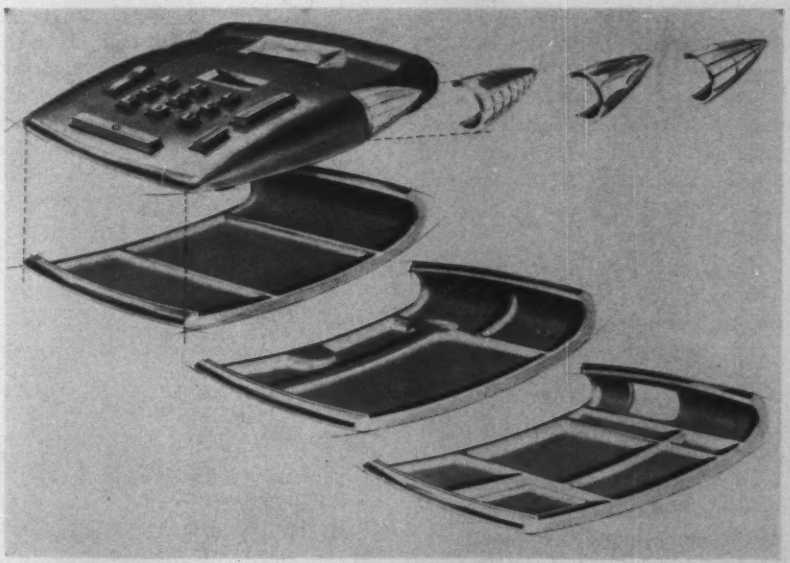
Low Production—With few exceptions, these special - machining methods are really volume producers. Multiple-station setups speed the ultrasonic dicing of transistor elements and other small parts.

During the steel strike, chemical-milling plants demonstrated their volume capabilities by slimming down sheet stock. They processed available gages to obtain the sizes needed for use in missiles.

Generally, you should look to special - machining methods when you have unusual problems. If the job requires chemical milling, the best solution may be to turn the work over to a specialty processor, who is an expert in the field.

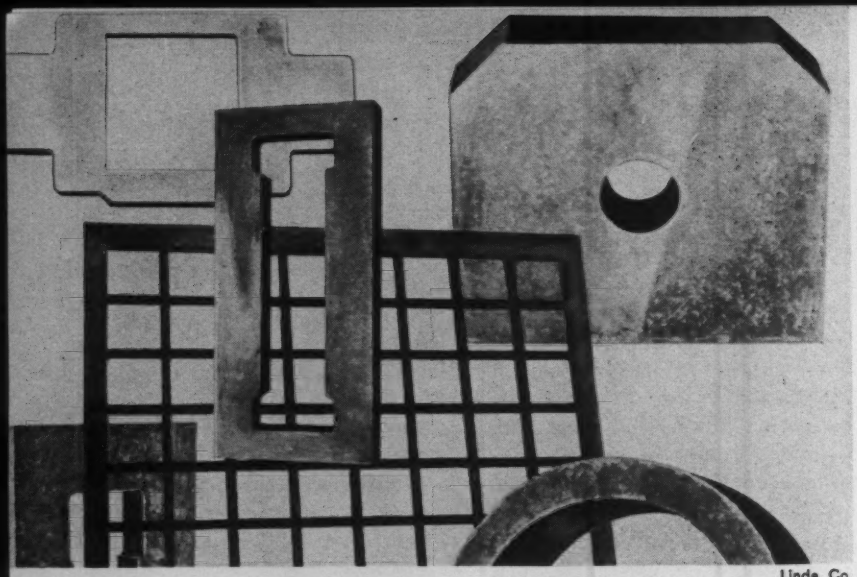
In the case of high-heat cutting, particularly with a constricted-tungsten arc, material-service centers report wide success. As a result, they've reduced material costs for end users.

What About Sizes? — From the



Turco Products, Inc.

SIMPLIFY DESIGN: Chemical milling is ready to take over a wide variety of commercial jobs. This exploded view of an adding machine shows how the bottom section can be processed. Parts at upper right are decoration.



Linde Co.

VARIED SHAPES: The tungsten-arc process can be used to shape complex parts. An intense heat, about 28,000°F, melts a localized work area.

large parts that can be handled by chemical, constricted-arc, and electrolytic methods, you run the gamut in size down to the micro-miniatures. Ultrasonic-machining methods cut materials, regardless of conductivity. But they limit part sizes to a few inches.

With electro-machining methods there are dual requirements which must be met. You need both a conducting tool (or electrode) and electrical conductivity within the part that's being worked.

Straight chemical machining also has limitations. Such processing may or may not affect mechanical properties of the surface. This potential damage hinges on the metal and the chemical combinations used. Most chemicals for use on aluminum and magnesium show little or no effect.

Titanium alloys prove more of a problem. They tend to pick up hydrogen during processing with some acid reagents. Therefore, they may require vacuum degassing.

Handle New Materials—In addition to wrought aluminum and both wrought and cast magnesium, chemical milling has been done commercially on steel and steel alloys. Research work shows definite potential for high-strength steels, stainless alloys and a number of the high-temperature alloys.

Experimental efforts also are directed toward the chemical processing of beryllium, columbium, molybdenum, tungsten and zironium. Commercial success with these appears to be just around the corner.

With these materials there's considerable promise. Top men at the Aerospace Industries Assn. report that chemical milling may prove one of the most successful processes. It should be pointed out, though, that this field of use hinges on the removal of metal from thin sections, complex contours, large areas or depths less than a half inch. It can't be expected to handle heavy metal removal, such as hogging operations on thick plates.

Other Advancements—All these special methods are in commercial stages of development. You can use them in their proper spheres, and with expert assistance, on current shop-fabrication problems.

Some other methods may prove useful, although they have yet to demonstrate commercial success. These include electron-beam machining and plasma-jet cutting and shaping processes.

In the first, a stream of electron-beam pulses are directed at metals in a high vacuum. This burns or vaporizes fine holes or small, irregular shapes. The problem of operating in a vacuum poses some size limitations. Best potential uses, manufacturing research leaders say, may be for radio and television parts.

Possible Uses—Since this cutting process can be used to make shaped holes in small dies, it's useful for extruding irregular fibers. Of course, the melting and welding of rare metals are other metalworking possibilities. The vacuum acts as a protective measure in these applications.

The plasma arc or jet is so new that its potential has hardly been fully explored. Two possible uses are now being considered. One is to see if the plasma jet can serve to heat and soften high-temperature alloys prior to cutting.

Because of the arc's ability to contain heat in a very small local area, it can increase cutting speed without creating distortion or warpage. This method also looks promising for alloys which normal cutting tools aren't able to handle.

ACKNOWLEDGMENTS

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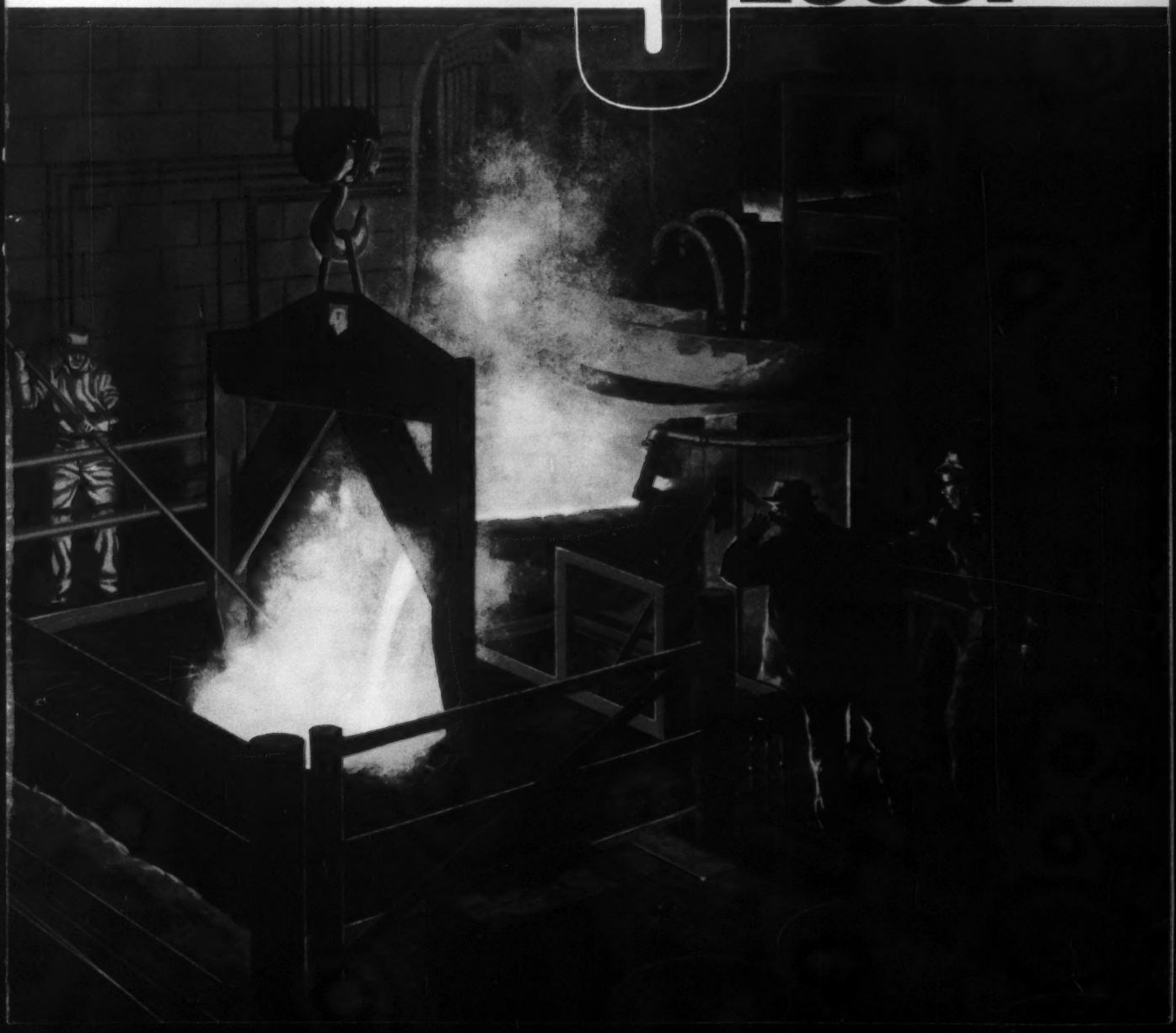

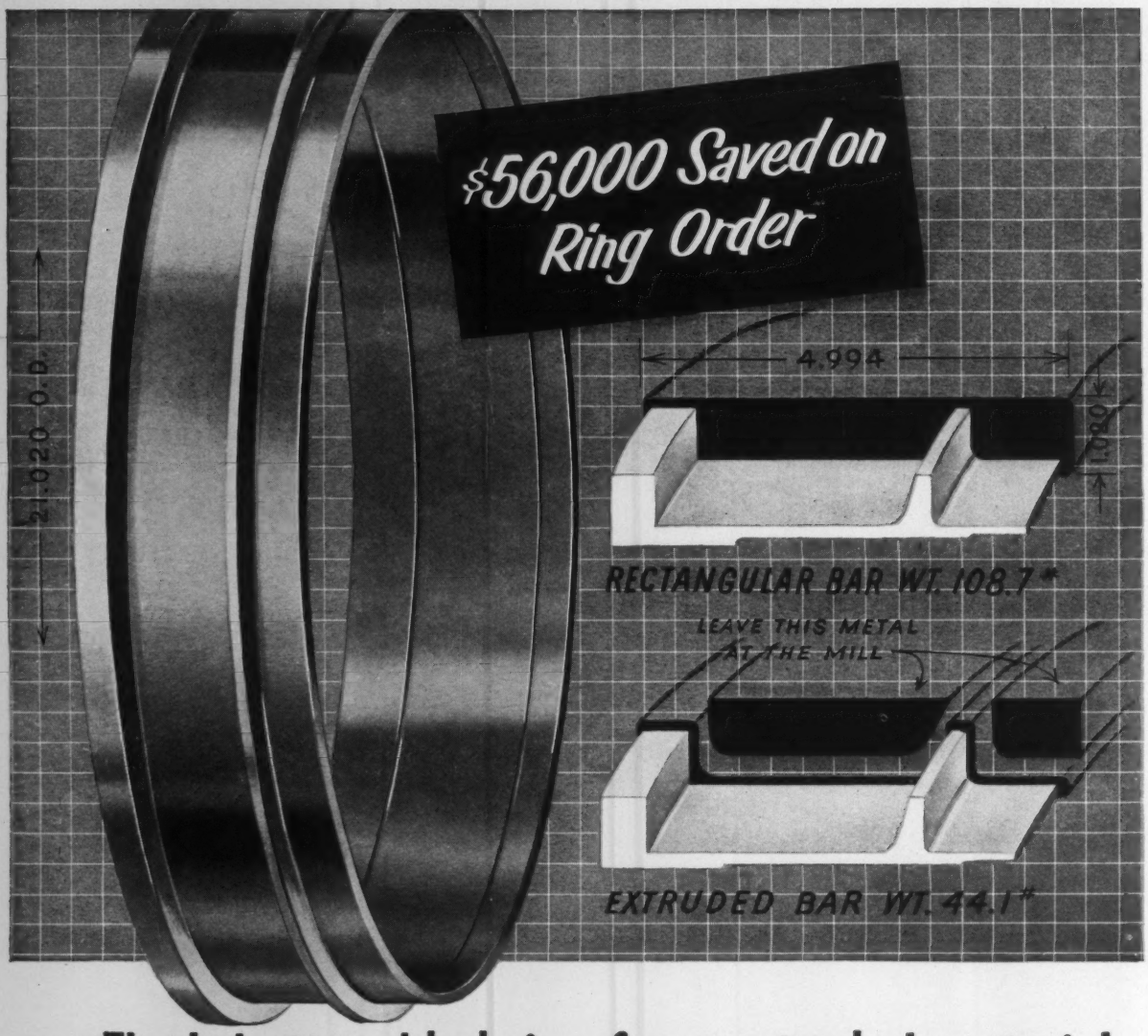

Flash butt-welded ring from extruded material slashes away 64 lbs. of stainless 310

Only 1/3 as much material was required when a special extruded section was substituted for bulky bar stock in this flash butt-welded ring. By leaving 2/3 of the material at the mill, instead of hogging it out, Amweld saved its customer $76.83 per ring—plus hours of expensive machining. (Savings compared to the forgings originally used are even greater.)

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and complete machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 120 DIETZ ROAD • WARREN, OHIO

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Protective Coatings

Characteristics of two protective coatings are contained in a data sheet. The sheet also describes typical applications for the thermal- and shock-resistant coatings. (Lynn Porcelain Enameling Co.)

For free copy circle No. 1 on postcard

Fine Organics

Easy to use, a pocket-size index includes a total of 78 industrial maintenance products. The sheet helps solve maintenance problems. (Fine Organics, Inc.)

For free copy circle No. 2 on postcard

Snap-Acting Switches

Heavy-duty, metal-enclosed precision snap-acting switches are dealt with in a bulletin. Detailed descriptions and photographs show method of installing and structural details. Dimensioned drawings are clear. (The W. L. Maxon Corp.)

For free copy circle No. 3 on postcard

Marking Machines

Marking machines for slabs, blooms, ingots and billets are presented in an eight-page bulletin. Featured is a series of remotely-controlled machines which can stamp 12 or more characters with one marking head. (M. E. Cunningham Co.)

For free copy circle No. 4 on postcard

Die Cutting Machines

Detailed descriptions of how die cutting machines are being used in a wide variety of industries are presented in a series of fact sheets. The sheets cover many areas of the fabrication of formed plastics and the production of missile nose cones. (United Shoe Machinery Corp.)

For free copy circle No. 5 on postcard

Alloy Steel Castings

Design advantages and engineering properties of alloy steel castings are covered in a bulletin. Welding and machining data are also included. (Alloy Steel & Metals Co.)

For free copy circle No. 6 on postcard

Thermostatic Air Valve

Facts, data and application information, on a miniature thermostatic valve, are presented in a four-page bulletin. The literature features performance curves and design information. (Solrac Inc.)

For free copy circle No. 7 on postcard

Alloy Steel Pipe

Complete data on the corrosion-resistant qualities and physical features of steel pipe are shown in an eight-page brochure. The file-size brochure is illustrated with photos of the pipe in various applications. (The Youngstown Sheet & Tube Co.)

For free copy circle No. 8 on postcard

Circuit Checkout

A 12-page brochure outlines the company's applications in electronic circuit checkout. Typical case histories cover uses, advantages, and savings experienced in production-line checkout and operational testing. (Lavoie Laboratories, Inc.)

For free copy circle No. 9 on postcard

Centrifugal Pumps

For users of centrifugal pumps, a 12-page selection catalog contains charts. They show the recommended temperature and pressure ranges for the pumps. Illustrations, brief descriptions and specifications are shown for each of the

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **12/8/60**

Circle numbers for Free Technical Literature, Design Digest, or New Equipment:

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Company .....

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FREE LITERATURE

ten classifications of pumps. (For free copy, write on company letterhead to Dean Bros. Pumps, Inc., 323 W. 10th St., Indianapolis 7.)

Integrated Controls

Integrated control systems, for aircraft and missile variable displacement hydraulic pumps, are described in a bulletin. The bulletin covers five special control systems. Curves illustrate typical regulation characteristics of each type. (Vickers Inc.)

For free copy circle No. 10 on postcard

Crane Weight Indicator

For all types of cranes, a weight indicator is the subject of a four-page bulletin. Specifications and information describing the easy-to-install indicator are given. (Martin-Decker Corp.)

For free copy circle No. 11 on postcard

Measuring Systems

The operation and selection of self-generating, three-phase electric speed measurement systems are described in a four-page bulletin. The systems measure rotary movement with accuracy of 0.3 of 1 pct of full scale within the linear range. (The Meriam Instrument Co.)

For free copy circle No. 12 on postcard

Multi-Tool Machine

An eight-page catalog concerns itself with a multi-tool machine. The machine drills, taps, bores, reams and mills through numerical controls. Specifications are included. (The Jackson-Fotsch Co.)

For free copy circle No. 13 on postcard

Refractory Insulation

Described in a product information sheet is a light-weight refractory fiber insulation. The sheet contains complete information on the material. It lists recommended uses and advantages of the chemically stable material. (Johns-Manville)

For free copy circle No. 14 on postcard

Liquid-Level Switch

A folder describes a unitized liquid-level switch. The switch combines an ultrasonic probe and a transistorized control into an integral unit. The literature gives specifications and relates how the liquid-level sensor is capable of monitoring a large number of liquids. (Acoustical Assoc., Inc.)

For free copy circle No. 15 on postcard

Concentric Grinder

Fully illustrated and described in a four-page bulletin is a 4-in. concentric grinder. (Landis Tool Co.)

For free copy circle No. 16 on postcard

Industrial Lift Truck

The place of the heavy-duty, industrial lift truck in industry is pictorially described in a 12-page booklet. In addition, steel handling is illustrated. (Automatic Transportation Co.)

For free copy circle No. 17 on postcard

Radial Drill

Described in a 16-page booklet is a 9-in. radial drill. The drill is designed to speed production and increase accuracy on a wide range of drilling, boring and tapping operations. The booklet gives complete information on the design features, operating advantages, capacities and specifications. (Giddings & Lewis Machine Tool Co.)

For free copy circle No. 18 on postcard

Seam Welder

Supplemented with illustrations, a brochure fully describes an air-operated, press-type, three-phase seam welder. Machine data are tabulated to indicate kva range, throat depths, welding currents, electrode forces. Dimensional drawings are also supplied. (Sciaky Bros., Inc.)

For free copy circle No. 19 on postcard

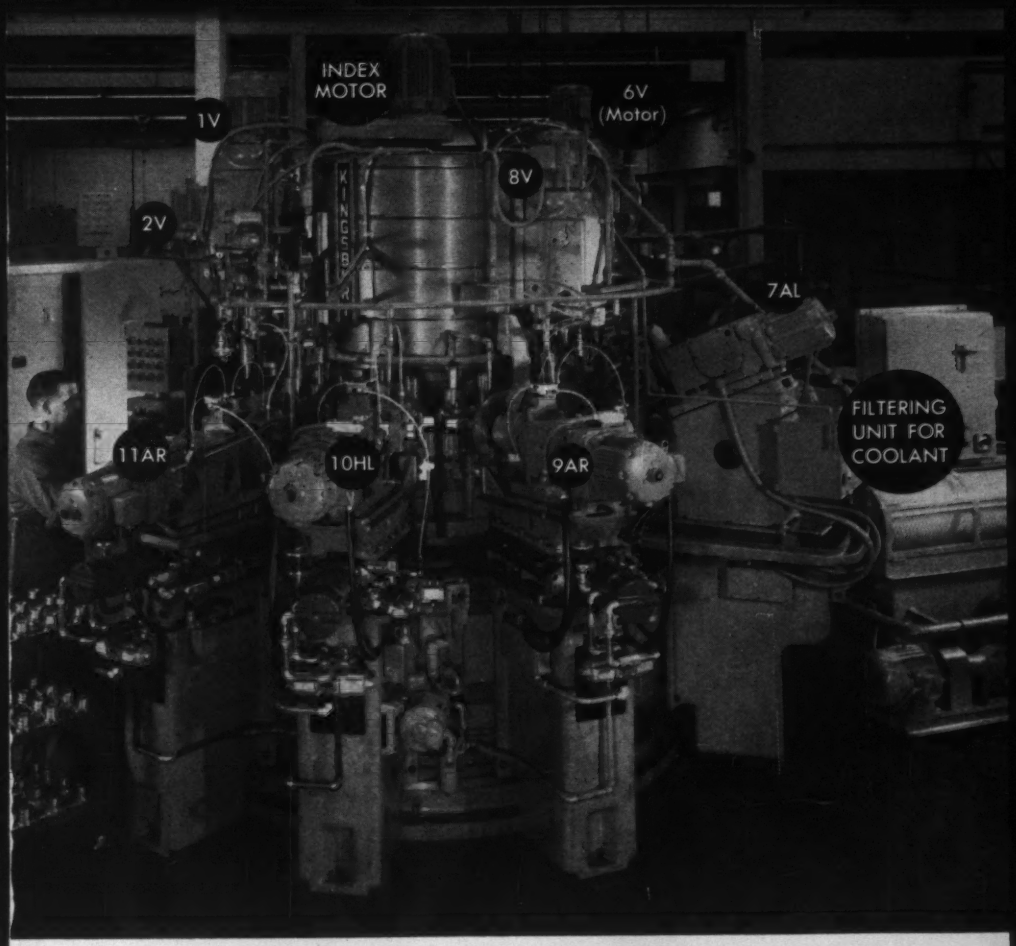
Air-Powered Tools

Portable air-powered and electric tools made by the manufacturer are covered in their new 72-page catalog. Products and services are divided into seven categories. (For free copy, write on company letterhead to Buckeye Tools Corp., 5003 Springboro Pike, Dayton 1.)

Welded Tubing Weights

Weight computations are easily obtained for welded steel tubing in a 16-page brochure. The tables give dimensions and weight per foot for round mechanical tubing up to 10-in. square. This is also given for rectangular tubing up to 5 in. and pressure tubing up to 5 in. (Jones & Laughlin Steel Corp.)

For free copy circle No. 20 on postcard



12 OPERATIONS ON GOVERNOR BODY

1V Vertical
Step drill valve hole through

2V Vertical
Mill face 7200 rpm fine finish

3H Horizontal hidden
Rough bore large hole

4AL Angular left, hidden
Drill angular oil hole

5H Horizontal, hidden
Drill flash in 4 holes

6V Vertical
Step gun ream part of valve hole

7 HR Horizontal right, hidden
Drill angular oil hole

7 AL Angular left
Drill angular oil hole

8V Vertical
Step gun ream part of valve hole

9AR Angular right
Mill first oil pocket

10HL Horizontal left
Mill second oil pocket

11AR Angular right
Mill third oil pocket

Kingsbury machine produces fine finish at high rate, performs variety of operations

Easy change-over for work on similar part

In one chucking of the work twelve units on this Kingsbury perform all of the operations shown. With a 19-second time cycle for the operations and indexing, the gross production rate is 190 parts per hour.

SOME NOTEWORTHY FEATURES

Mill face. A motorized spindle produces a fine finish by running at high speed and then retracting from the work on the return stroke.

Mill oil pockets. Airdraulic slides position oscillating heads that feed the cutters sideways inside the hole.

Drill angular oil holes. Each unit is at an angle to the radial center line through its station. Two units are mounted on angular risers.

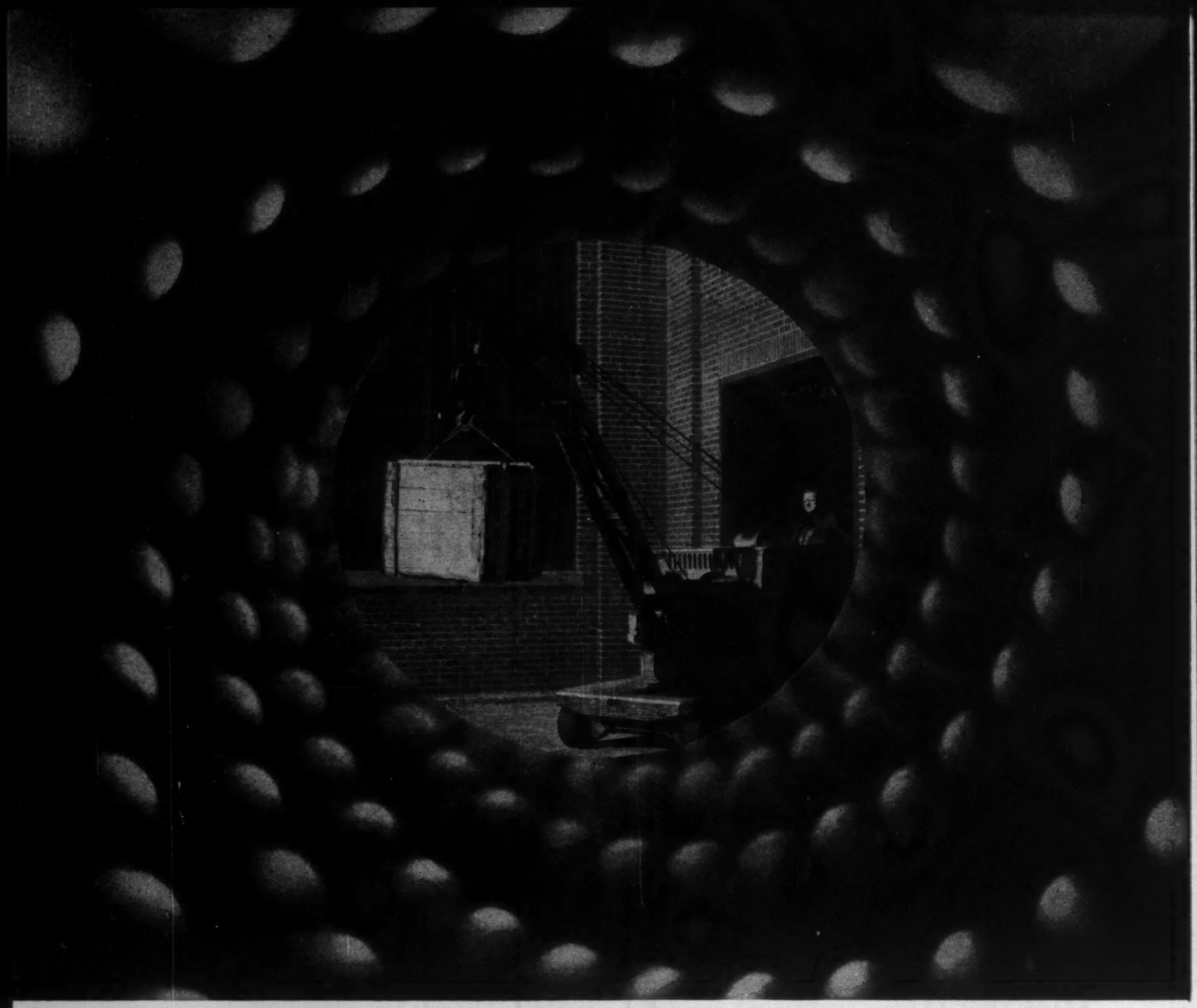
Five-step valve hole. Two units step gun ream with high speeds and fine feeds using filtered coolant under pressure.

With a few changes this machine also operates on a similar part. A seven spindle auxiliary head can be mounted in two different positions to drill four holes in one part or three in the other.

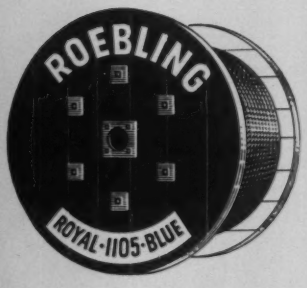
WE BUILD SIMPLE MACHINES TOO

If you do drilling type operations in high production — simple or complex — we want to talk business. Our good basic design and accurate rugged construction pay off for you in minimum rejects and downtime and you get years of dependable production. May we make a proposal? Kingsbury Machine Tool Corp., Keene, New Hampshire.

KINGSBURY MULTI-UNIT AUTOMATICS



ROEBLING ROYAL BLUE WIRE ROPE DESIGNED AND MADE TO SERVE YOU WELL



ROYAL BLUE: *We put a lot of work into it—You get a lot of work out of it.*

This is the inside view of Roebling Royal Blue — its core has been removed to show the uniformity and symmetry of the rope structure. It's not only what's outside that counts; it's what's *inside* as well. You see how concerned we are with internal security.

All the inspections and tests that Royal Blue goes through enable us to know that the rope we build will do what we sell it to do. These quality control measures help us — as they do you — to take the *long* view of Royal Blue. A brochure on long-lasting Royal Blue, its resistance to shock, abrasion, crushing and bending, is available on request. Ask your Roebling wire rope distributor or write to Roebling's Wire Rope Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities • John A. Roebling's Sons Division, The Colorado Fuel and Iron Corporation

PATENT REVIEW

New Patents In Metalworking

Die-Forged Parts

Forged powdered metal articles, K. M. Bartlett (assigned to Thompson Ramo Wooldridge, Inc., Cleveland), Oct. 25, 1960. A method forms dense, strong, creep-resistant die-forged powdered metal articles, such as poppet valves. A suitable amount of slip-preventing powdered metal aggregate is incorporated in the iron-aluminum matrix. No. 2,957,232.

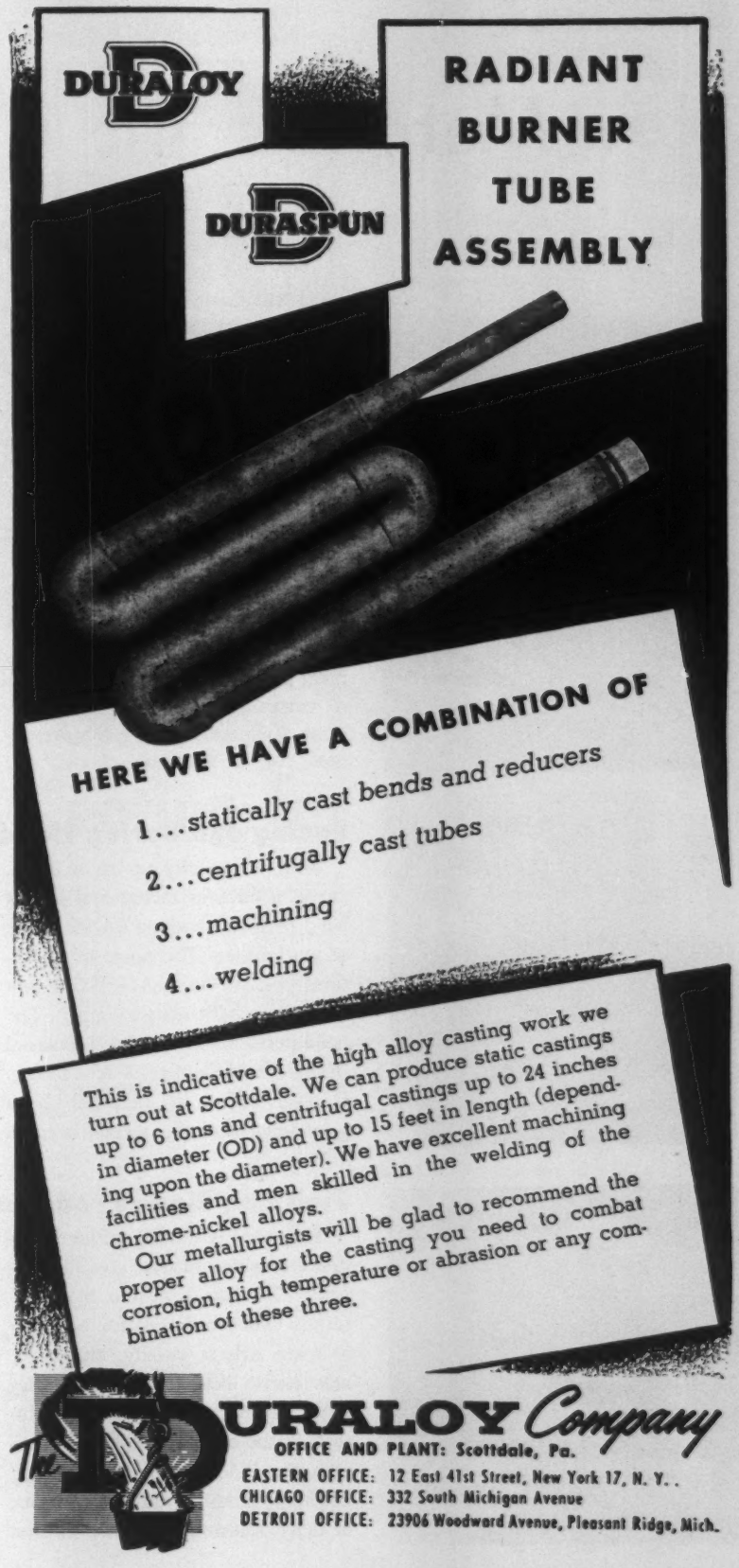
Blast Furnace Material

Method for agglomerating iron ore fines, W. T. Purvance (assigned to U. S. Steel Corp., Pittsburgh), Nov. 1, 1960. In the low-cost agglomeration of iron ore fines to form a blast furnace material, the fines are mixed with hot gases. The mixture is then sprayed with cool water, whereby the fines are deposited on a solid surface as a crust. Chunks of this crust are broken away for use. No. 2,958,596.

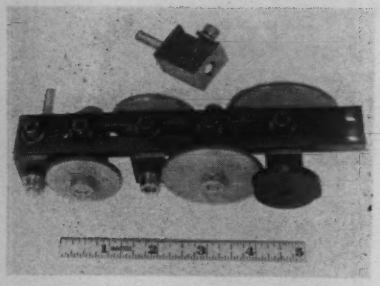
Iron Oxide Ore Pellets

Pelletization of iron ore concentrates, F. D. De Vaney (assigned to P-M Assoc., Cleveland), Nov. 15, 1960. A mixture, for use in the production of iron oxide ore pellets of improved strength, consists of specular hematite ore largely in the plus 10-micron particle size range, magnetite or magnetic taconite largely in the plus 10-micron particle size, a solid fuel, and bentonite. The balls or pellets are indurated under conditions to effect oxidation and grain growth of the magnetite particles among the specularite particles. No 2,960,396.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.


DURALOY
DURASPUN
RADIANT
BURNER
TUBE
ASSEMBLY
HERE WE HAVE A COMBINATION OF
1...statically cast bends and reducers
2...centrifugally cast tubes
3...machining
4...welding
This is indicative of the high alloy casting work we turn out at Scottdale. We can produce static castings up to 6 tons and centrifugal castings up to 24 inches in diameter (OD) and up to 15 feet in length (depending upon the diameter). We have excellent machining facilities and men skilled in the welding of the chrome-nickel alloys.
Our metallurgists will be glad to recommend the proper alloy for the casting you need to combat corrosion, high temperature or abrasion or any combination of these three.
The DURALOY Company
OFFICE AND PLANT: Scottdale, Pa.
EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
CHICAGO OFFICE: 332 South Michigan Avenue
DETROIT OFFICE: 23906 Woodward Avenue, Pleasant Ridge, Mich.

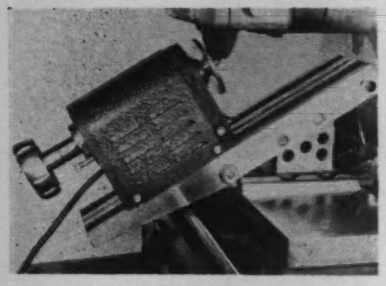
New Materials and Components



Gear Chassis Obtains Infinite Range of Ratios

With maximum simplicity, a quick-change gear chassis makes it possible to obtain an infinite range of ratios. The chassis incorporates into any mechanism where gear ratios must be changed quickly; also where a specific gear train has to be assembled rapidly. Among its many uses, it can measure repetitively any linear distance when driven by a measuring wheel of known circumference. It can also measure any time interval when driven by a small synchronous motor. (Foster & Allen, Inc.)

For more data circle No. 25 on postcard, p. 127



Grinder Attachment Allows Variety of Operations

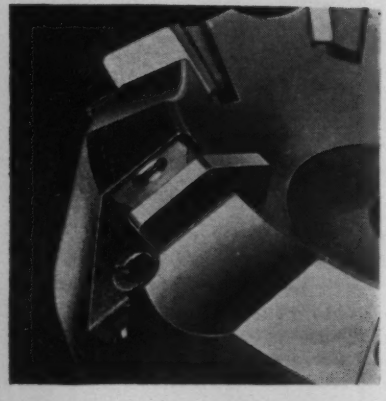
A cylindrical grinding and indexing attachment makes possible a wide variety of grinding operations on any surface grinder. The attachment permits a considerable latitude of cutter and tool grinding operations. By merely placing this attachment on a magnetic chuck, and mounting the work between centers, straight or tapered jobs can be handled quickly. Use of gage blocks completely eliminates guess work. Capacity length between centers is 7½ in. (Therien Engineering & Machine Co.)

For more data circle No. 26 on postcard, p. 127

Facing and Boring Head Extends Operations

With a capacity up to a 36-in. circle, a circular facing and boring head permits handling a wide range of workpieces. The range of operations possible on many existing machines is broadened very much. The head performs internal and external boring, facing and back spot facing. It does this on all materials from gray iron to exotic metals used in space-age components. The head is regularly supplied with a 3½-in. bore. It can also be sleeved or bored to fit other size spindles and boring bars. The head design increases the usefulness and capacity of horizontal boring mills and radial drills. This is done without the usual change of setup procedure. (Keller Equipment & Mfg. Co., Inc.)

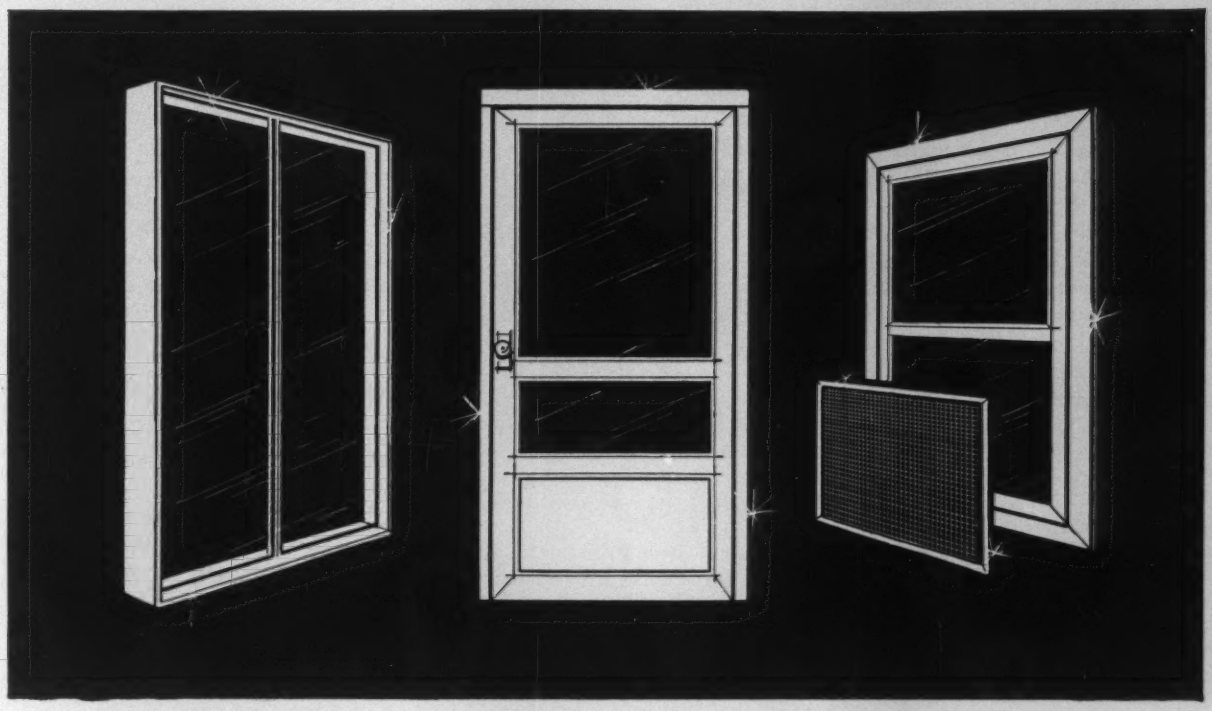
For more data circle No. 27 on postcard, p. 127



Finishing Blade Produces Finer Surface Finish

Throw-away milling cutters, with micro-finishing blades, give fine finishes. For use with the manufacturer's cam-pin design for precisely locating inserts axially, the blade acts much like a wiper blade. By replacing just one of the square inserts in the company milling cutters with the blade, smoother finishing milling is possible. Cutters with one of these blades give surface finishes consistently below 50 micro-inches, rms. The blade inserts in the slot with the least amount of runout. In this way, it can be positioned anywhere within the adjustment range (0.030 in.) of the cam pin. The blade cutting edge is parallel to the cutter flange at right angles to spindle and tends to wipe away cutter marks. The blade compensates for spindle misalignment. (Wesson Co.)

For more data circle No. 28 on postcard, p. 127



NOW... Colorless Protective BONDERITE Coating for Aluminum

BONDERITE 725 adds exceptional corrosion resistance to aluminum without changing the appearance of the metal!

This new Bonderite produces a *colorless*, amorphous oxide coating on aluminum without the use of electric current. In addition to imparting excellent corrosion resistance to aluminum, Bonderite 725 coatings are an excellent base for clear lacquer and paint finishes.

Colorless Bonderite 725 is particularly suited for use on aluminum building products, windows, storm and screen sash, doors, aircraft parts, automotive trim, boats, appliance parts, castings, and extrusions of all varieties.

Aluminum articles coated in Bonderite 725 and finished with clear lacquer easily meet the stringent requirements of the lime and mortar test specified for certain building products. In addition, articles finished in clear lacquer have good abrasion resistance that reduces scratches during handling and erection.

Bonderite 725 is an efficient, economical chemical treatment applied by spray or immersion application in simple processing equipment. Processing times are as low as 5 seconds.

Up-grade the quality of your products by supplying corrosion resisting Bonderized aluminum in its pleasing natural color. You can add this sales advantage to your product at a treatment cost that will please you.

For complete information now, call or write Parker, or use coupon below.

Parker
Rust Proof Company
2197 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base • BONDERITE and BONDERLUBE aids in cold forming of metals • PARCO COMPOUND rust resistant • PARCO LUBRITE—wear resistant for friction surfaces • TROPICAL—heavy duty maintenance paints since 1883

*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

Parker Rust Proof Company
2197 E. Milwaukee, Detroit 11, Michigan

Please send Bulletin which describes Colorless Bonderite for Aluminum.

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

DESIGN DIGEST

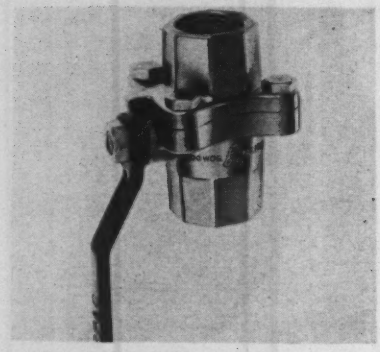
Rust Remover

Non-acid and non-flammable, a rust remover removes rust, carbon, scale and paint from ferrous metals. It does this without the dangers of hydrogen embrittlement or dimensional tolerance loss. The product does its removal work by means of a simple one-tank operation followed by a pressure rinse. Metals withdrawn from the process require no after-neutralization. (Turco Products, Inc.)

For more data circle No. 29 on postcard, p. 127

Ball Valve

Rated at 300 lb for water, oil or gas service at a maximum temperature of 250°F, a ball valve comes in sizes ½-2 in. inclusive. It has undergone hundreds of thousands of openings and closings without signs of leakage or wear. The valve is fast and easy to operate. It requires only a quick quarter turn of the handle to open or close. The valve is precision-built for general purpose service. The bronze valve has "auto-mating" seats. These insure positive sealing in either flow direction. This



makes it ideal for vacuum service. The perfectly machined ball combines with the "auto-mating" seats for smooth positive operation. (American Chain & Cable Co., Inc.)

For more data circle No. 30 on postcard, p. 127

Leakage Limit Gage

For pre-set and variable flow control, a leakage limit gage is capable of precise control of any liquid or gas. The gage adapts to uses where a pre-set flow is desired from zero to a pre-determined maximum flow range of about 500 cu centimeters per minute. The instrument has built-in ability to be roughly handled or to be disassembled, cleaned and reassembled without any change of pre-set characteristics. (Acme Industrial Co.)

For more data circle No. 31 on postcard, p. 127

Push-Button Station

All rubber, a heavy-duty push-button station is corrosion-proof. It has weather-sealed construction. The station is recommended for any two-station push-button application, such as start-stop, up-down, forward-reverse, off-on. Flush mounting can be achieved on metal surfaces. (Joy Mfg. Co.)

For more data circle No. 32 on postcard, p. 127

Measures Air Flow

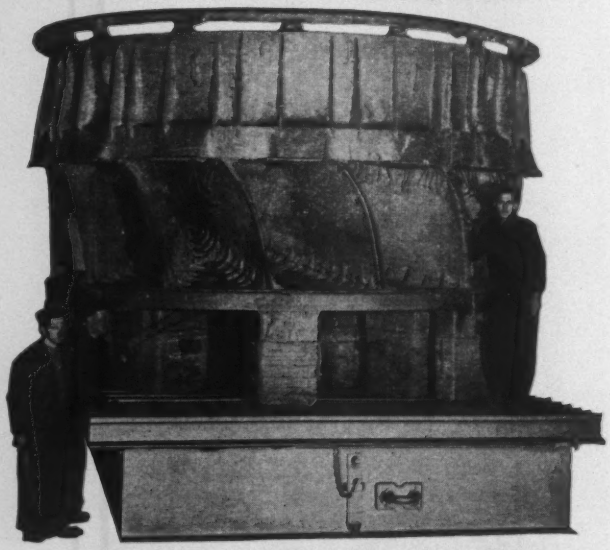
For accurate measurement of low-velocity air flow, a transducer

EXECUTIVE REPORT #21

THEY SAID "IT COULDN'T BE DONE"

but Wheelabrator® cleaned this 100-ton casting in 20 minutes

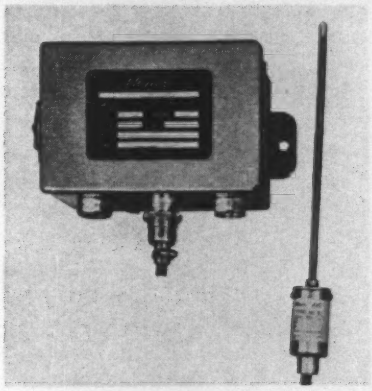
The enormity of a casting like this would have made it one of those "impossible" cleaning jobs by manual airblasting. But a Wheelabrator Car-Type Room equipped with 8 blasting wheels takes it in stride at Canadian Steel Foundries, Ltd. Here, castings measuring 20 ft. in diameter and over 12 ft. in height are cleaned thoroughly in blast cycles of only 15 to 20 minutes in the automated Wheelabrator room.



Wheelabrator engineers, leading in experience in designing machines for special applications, have developed a line of blast rooms employing unique work-handling methods suited to varied requirements. For illustrated examples, ask for Catalog 142-D. Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

system is rugged. It is designed for permanent installations. In addition to the power supply, the device's design combines a precise air flow



sensing element with a read-out system. This retains sensing element accuracy. (Alnor Instrument Co.)

For more data circle No. 33 on postcard, p. 127

Actuates Mechanisms

Fast acting, a unitized stored-energy package actuates a wide range of mechanisms. This small, light weight, compact package releases high-pressure gas from the storage bottle. It does this by an explosive-actuated pressure release valve. This valve operates in only 0.002 of a second at recommended firing current of 2 amp. The minimum firing current required to operate this explosive actuated valve is only the amperes from a power source as low as 1½ v. Operating temperatures range is from —65° to —160°F. The standard gaseous charge is nitrogen at 350, 500, 1000 or 1500 psi. (Conax Corp.)

For more data circle No. 34 on postcard, p. 127

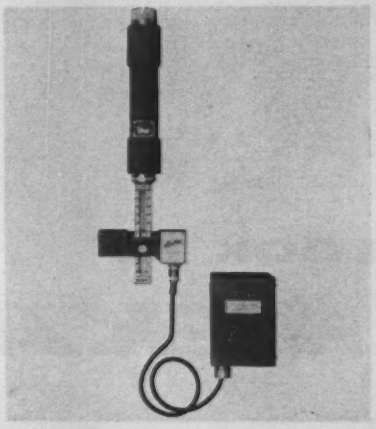
Adjustable Switch

Adjustable differential travel is a feature of a new basic switch. A knurled wheel on top of the switch permits differential travel adjustment from 0.0025-0.007 in. Changing the differential travel changes the contact break distance, the pretravel distance and the operating and differential forces. The operating force varies from 12-32 oz; the differential force from 2-15 oz. This switch is suited for controlling such precision devices as pressure controls or blower fans. The adjustment wheel permits extremely sensitive control of on-off cycles. (Micro Switch)

For more data circle No. 35 on postcard, p. 127

Indicates Flow Failure

Protection against hazard due to failure of flow of gas to a process or



heat treating furnace is provided by a flow alarm. The device operates in conjunction with a standard com-

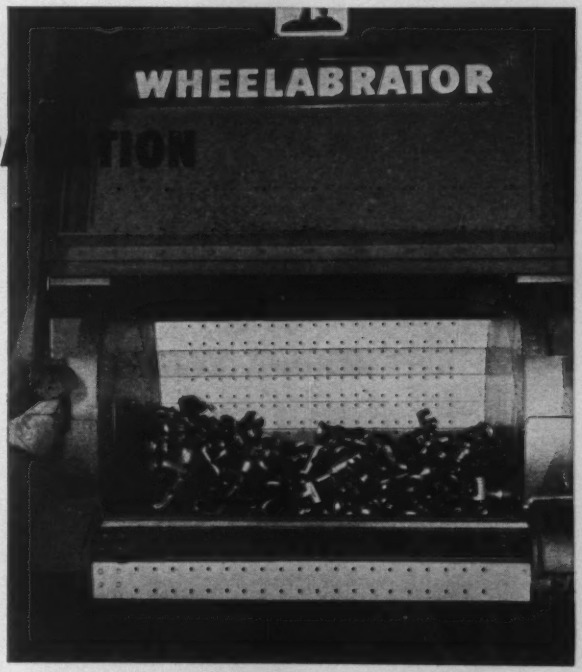
EXECUTIVE REPORT #29

BETTER SURFACE PREP TION

...Wheelabrator® does an eight hour job in eight minutes!

Better surface condition than was achieved in 8-hour wet tumbling cycles is now accomplished in just eight minutes in a Wheelabrator Super Tumblast at Landers, Frary & Clark, in preparation of food chopper parts for tinning. Space requirements were reduced three-fourths with the elimination of the 30 wet tumbling mills. One man does work that formerly required three. Breakage has been reduced sufficiently to eliminate one inspection. "The Super Tumblast modernized a practically primitive operation", according to the Landers, Frary & Clark foundry superintendent.

Modernizing with Wheelabrator airless blast equipment can save you time and money, and result in a superior product as well. It costs nothing to have a Wheelabrator engineer give you all the facts. Write to Wheelabrator Corp., 510 S. Byrkit Street, Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ontario.



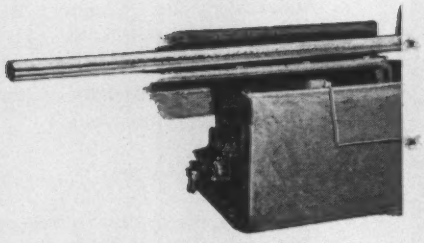
WHEELABRATOR
AIRLESS BLAST EQUIPMENT

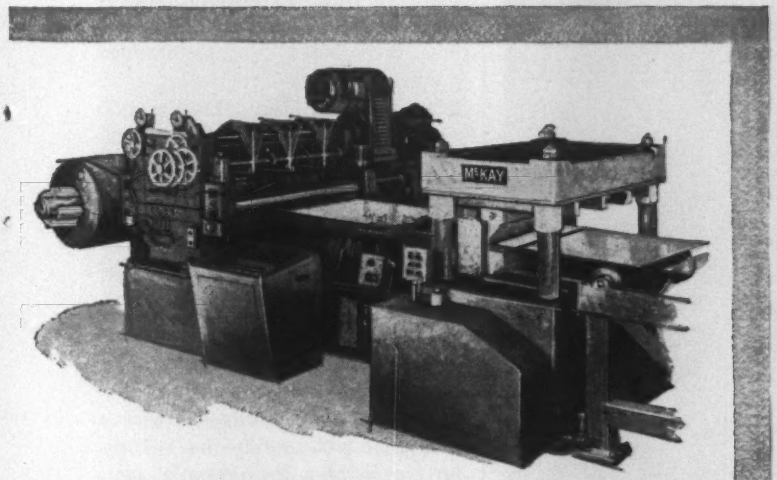
LOOK TO

McKAY MACHINE

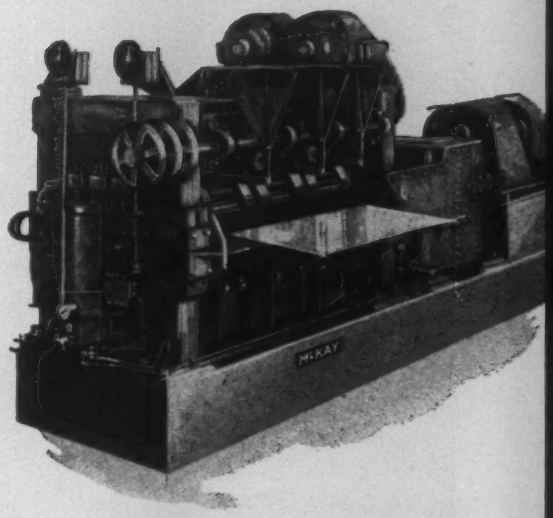
FOR PROGRESS IN METAL PROCESSING

McKAY PIPE MILLS





McKAYMATIC* DIE SHEAR LINES



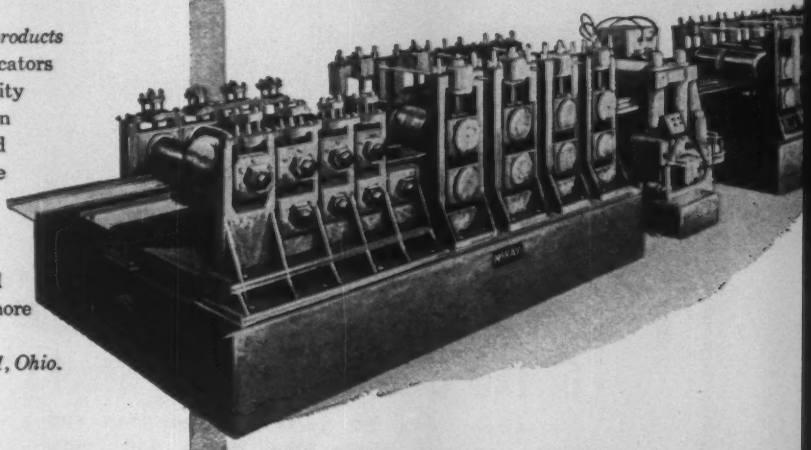
McKAY ROLLER LEVELERS

No machine manufacturer puts more into its products than does McKay. Metal producers and fabricators have learned they can expect and get integrity and honest value—the most advanced design and engineering—the finest construction and service—when they specify McKay Machine metal processing equipment.

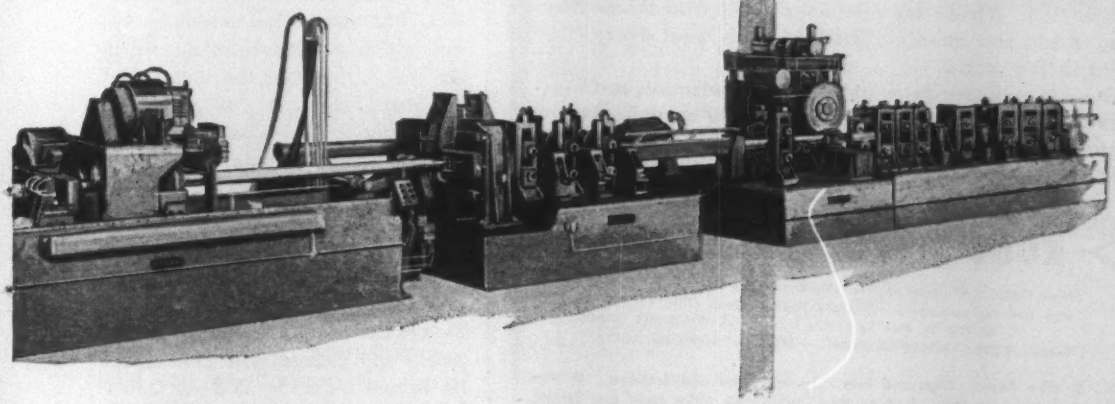
Look to McKay Machine in 1960 for more automatic machines, like those illustrated here, well conceived and skillfully developed to help you do your work faster, better and more economically than ever before.

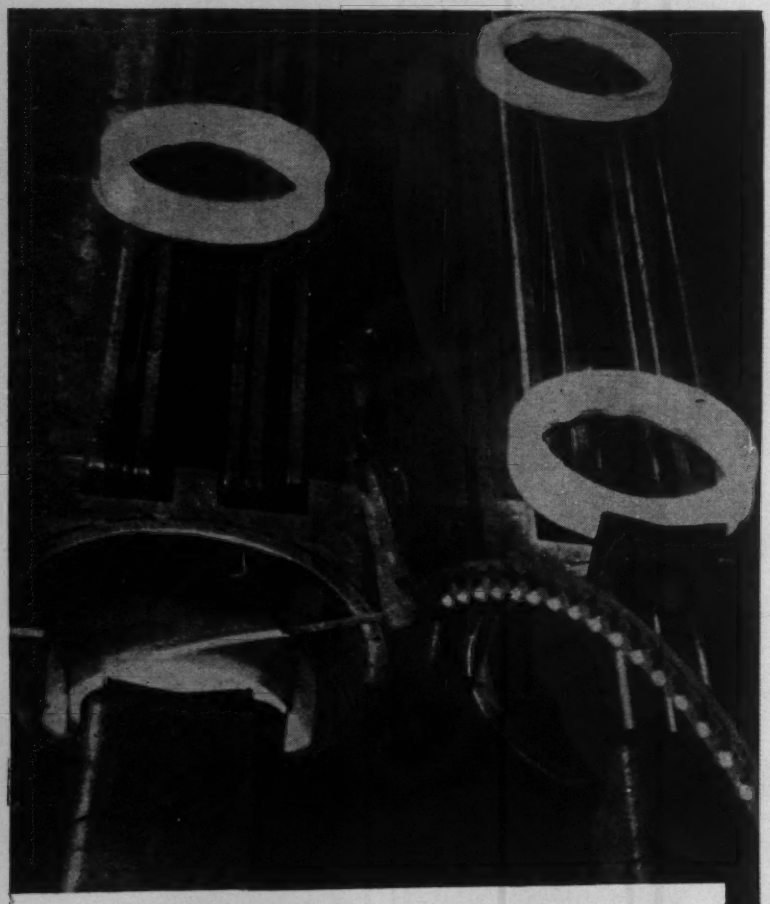
The McKay Machine Company, Youngstown 1, Ohio.

*TM



McKAYMATIC* FORMING MILLS





TOP Manufacturer of Wire Rod in the Orient . . . Kobe Steel !

As a result of over 50 years of experience and exhaustive research, Kobe Steel Works, Ltd., now stands unequalled as a manufacturer—with the highest production and dependability on quality and quantity —of Wire Rod. These are produced in High and Low Carbon, Alloy and Stainless Steel etc., to meet every standard in the world.

Kobe Steel is supreme as an industrial organization and is forever manufacturing — from iron ore to secondary steel products on to industrial machineries—with best technical knowledge.

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New York Representative: c/o Nissho American Corp.
80 Pine St., New York, N.Y., U.S.A. Tel. WHITEHALL 3-7840
Cable: KOBE—"KOBESTEEL KOBE" · TOKYO—"KOBESTEEL TOKYO"

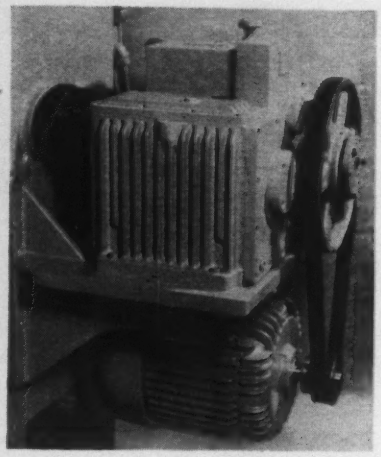
Main Products ■ Wire Rods: High and Low Carbon, Alloy and Stainless, ■ Wire Products: Plain and Galvanized Wire, Barbed Wire, Wire Nail, Wire Rope and Strand, Other wire products, ■ Bars and Extruded Pipes, ■ Industrial Machineries.

pany flow meter. The alarm uses the photo-electric principle. Should the flow drop below a predetermined point, the flow-meter indicator interrupts a light beam. This beam is focused on the photo-electric cell. The alarm sounds a warning or operates a purge system. (Waukee Engineering Co. Inc.)

For more data circle No. 36 on postcard, p. 127

Power Amplifier

For uses requiring higher horsepower ratings to move heavy loads, a mechanical power amplifier provides up to 2½ times greater torque output. It will amplify the 1/30th-hp output of a low-powered, two-



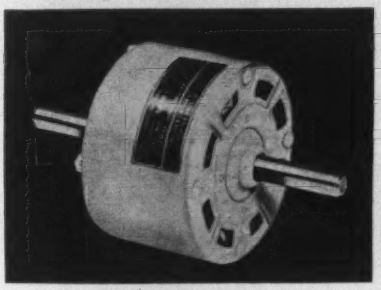
phase servo motor to deliver and control up to 4 hp. The amplifier offers continuous power over a 50-1 speed range. It will also amplify torque from any control input device. The unit has an external cooling system which recirculates oil in the box throughout the housing to dissipate heat; also to give high continuous horsepower ratings. (Seneca Falls Machine Co.)

For more data circle No. 37 on postcard, p. 127

Split Capacitor Motors

Two-, four- and six-pole, shaded pole and six-pole split capacitor motors find use for fractional horsepower applications. The motors can be wound for 115-, 208- or 230-v operation at 50 or 60 cycles. They can be engineered for single or

double shafts, thermal protectors, special mounting rings, terminals or other features to fit motor package needs. All motors feature special moisture-proof slot and cell insula-



tion; centrifugally die-cast rotors and extra-large bearings with or without relubrication provisions. (Leece-Neville Co.)

For more data circle No. 38 on postcard, p. 127

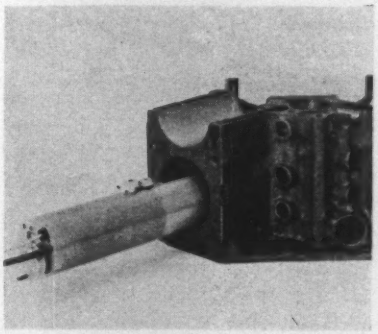
Epoxy Adhesive Cure

For epoxy adhesive, a one-minute room-temperature cure can be accelerated to 45 seconds with the use of infra-red lamps. The resin-hardener adhesive system is ideal for automatic meter-mixing-dispensing units. Expensive oven investments and heating costs are eliminated. Possible applications include bonding metal to metal, plastic to metal, plastic to plastic or any other porous or non-porous surfaces. (Allaco Products)

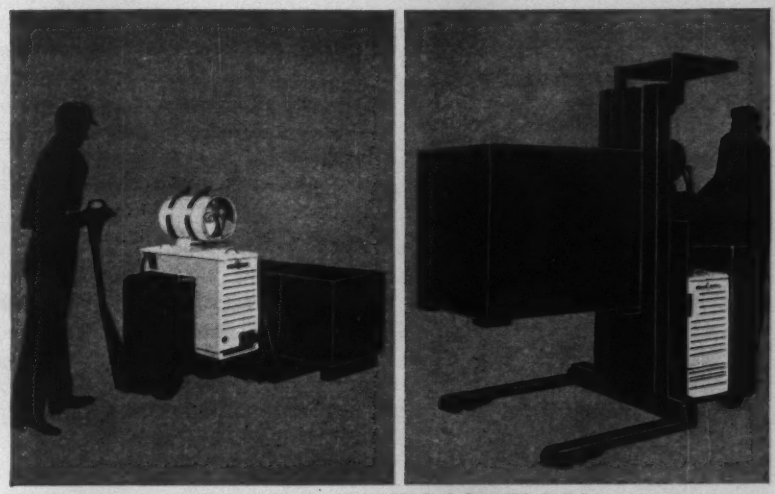
For more data circle No. 39 on postcard, p. 127

Measures Profiles

An electro-mechanical instrument measures and records flatness, roundness, waviness, roughness and flaws. It also measures total profiles



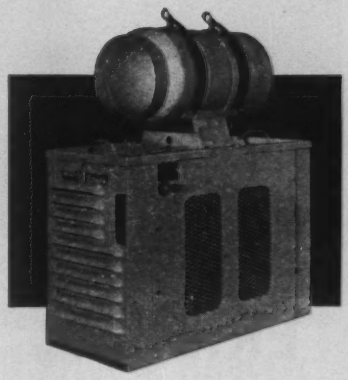
of practically any type of surface that can be produced by normal production methods. An internal linear pilotor is an accessory which



Pallet trucks to narrow-aisle fork lifts, Ready-Power W Series Units provide full-time power for all types of material handling vehicles.

Compact W Series Ready-Power Unit Assures Full-Time Electric Power for Small Rider and Walkie Trucks

You always get full power from small-size material handling trucks equipped with Ready-Power's W Series Power Unit. Generating its own electric power as it is needed, the W Series can operate continuously at top capacity. There is no power fatigue, no letdown.



Ready-Power W Series Units are designed to fit practically any make of electric walkie and small rider-type trucks. The compact units are easily installed or interchanged. A new 12 volt automotive-type starting and ignition system assures quick starts. Top cover and end plate are easily removed for quick accessibility to engine and controls. The unit can be equipped with either gasoline or LP-Gas fueling systems.

Ready-Power offers a complete range of dependable engine/generator power units for all makes and models of electric trucks . . . from walkies to industry's largest ram and die handlers utilizing Ready-Power diesel electric models. Mail coupon below for information.

READY-POWER

Please send me the Ready-Power Bulletins checked.

☐ Bulletin 126 on W Series Ready-Power Units.

☐ Bulletin 99-A covering the complete Ready-Power line.

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makes it possible to measure deep into out-of-the-way places. A 4-in. wide strip chart, used with the instrument, permits easy reading and identification of all surface irregularities. (Micrometrical Mfg. Co.)

For more data circle No. 40 on postcard, p. 127

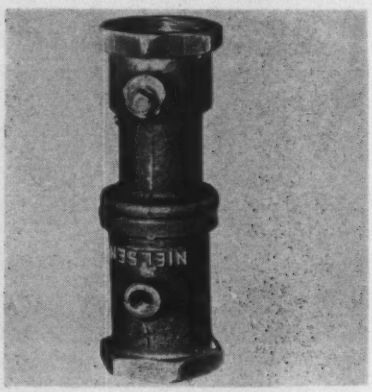
Silver Brazing Alloy

A silver brazing filler metal with a flux core gives faster and easier brazing. Application of flux is an essential part of a brazing operation. This product insures the correct amount of flux for the size of the brazing alloy used. (Air Reduction Sales Co.)

For more data circle No. 41 on postcard, p. 127

Air Charger

Operating through the vacuum generated by a patented venturi action, an air charger provides a continuous metering of air or other gases. It meters them into any pipeline carrying a flow of liquid under pressure. Test results indicate that



the air charger can handle the requirements of water pressure systems with storage capacity of over 2000 gal. The air changers can handle water flow from 360-6000 gph of pump pressures varying from 25-90 lb. (The Nielsen Mfg. Co.)

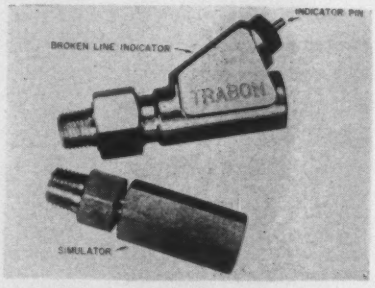
For more data circle No. 42 on postcard, p. 127

Magnetic Socket

For driving self-drilling, self-tapping screws, a magnetic socket is built of special materials. They enable it to withstand the stress and shock to which sockets are subjected when driving this type of screw. The new socket is used in conjunction with the manufacturer's extensions. (The Apex Machine & Tool Co.)

For more data circle No. 43 on postcard, p. 127

Broken Line Indicator



All-hydraulic in operation, a broken line indicator transmits a high pressure signal back to the pumping point. This provides immediate central warning of the broken bearing line. When central warning is given via light, horn or other fault signal, it is a simple matter to locate the broken line. An in-

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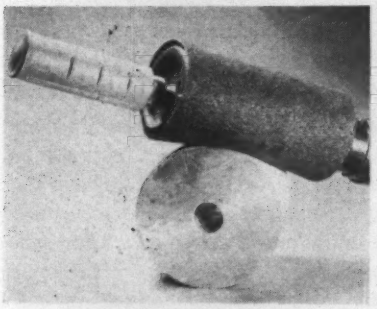
dicator pin, which normally protrudes from the indicator body, retracts. This gives visual indication of the trouble spot. The indicators are designed for use with the manufacturer's grease and oil systems; and circulating oil systems. (Trabon Engineering Corp.)

For more data circle No. 44 on postcard, p. 127

Sanding Roll

For the metal and woodworking trades, an air-inflated sanding roll is suited for portable coated abrasive operations. The roll is 3 in. in diam x 6-in. long. It is intended for high-production sanding on either flat or contoured surfaces. The 6-in length will sand large

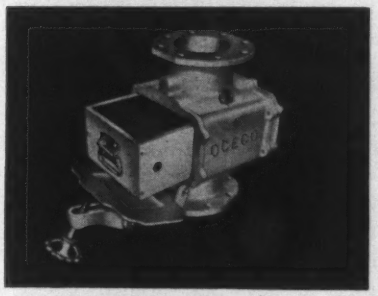


areas safely and without gouging. The rubber drum is replaceable by the user without special tools or the use of glue. Cloth covers for the roll are not needed. The air cushion construction of the inflated sanding roll permits a high degree of contouring. (Nu-Matic Grinders Inc.)

For more data circle No. 45 on postcard, p. 127

Dehydrators

Dehydrators remove the moisture from air taken into storage tanks, as product is being pumped out.

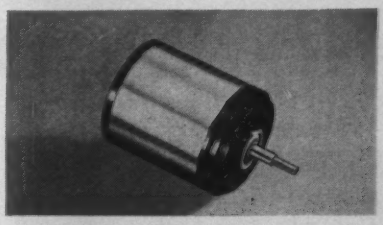


This prevents dilution and possible contamination of tank contents. The moisture-adsorbing material is held in a basket-like drawer with wire mesh top and bottom, that slides into a gas-tight housing. Air being drawn into the tank, as product is being pumped out, passes through the moisture-adsorbing mass and gives up its moisture. (The Johnston-Jennings Co.)

For more data circle No. 46 on postcard, p. 127

Magnetic Clutch

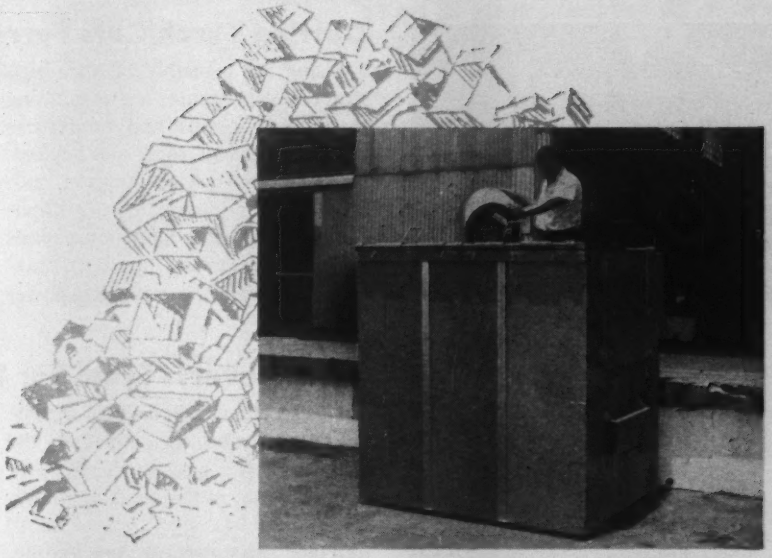
A basic direct-acting clutch is so designed that when the coil is de-energized, the input and output shafts are free to rotate. They do this independently of each other. Upon energization of the magnetic coil, the couplings become engaged. Consequently, torque may be trans-



mitted through the unit. (Sterling Precision Corp.)

For more data circle No. 47 on postcard, p. 127

NOW! You Can End Refuse Storage Problems...WITHOUT Capital Outlay



DUMPMASTER-Equipped Private Haulers Provide Containers and Efficient Service

If you're plagued with trash piles, scattered refuse, fire hazards, and hit-or-miss collection, there's a good chance you can do something about it . . . WITHOUT CAPITAL OUTLAY!

In most major cities DEMPSTER-DUMPMASTER-equipped private haulers will put clean, big-capacity storage containers at convenient locations in your plant . . . empty them mechanically on schedule, or on a call-in basis . . . all for a reasonable monthly fee.

When you containerize your refuse, plant housekeeping becomes easy, employee morale goes up.

Write today for the name of your nearest private hauler. We'll also send literature describing his service.

DEMPSTER DUMPMASTER® Equipped Private Haulers

Write Today for Free Brochure and Name of Nearest Private Hauler

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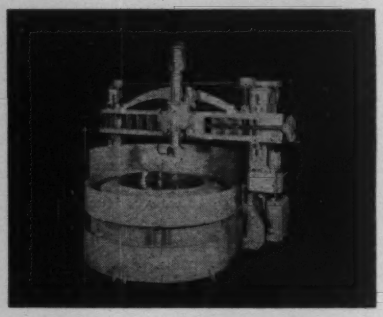
PRODUCTION IDEAS

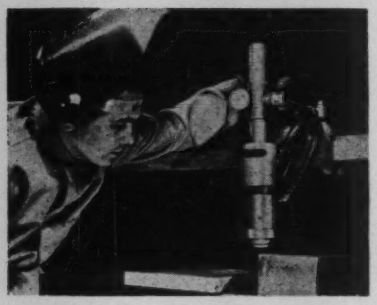
New Equipment and Machinery



Special Machine Grinds Large, Round Dies

For the metalworking industry, a machine grinds large, round dies for blanking, drawing and forming of various parts. The grinder is built to grind outside diameters, inside diameters and surfaces of large die rings. The unit handles hardened and ground rings varying from 40-80 in. in diam. The unit is also capable of automatic reciprocating feed in the vertical direction as well as on angles. The spindle is hydraulically controlled. It has infinitely-variable speed from 0-18 ipm and stroke from 0-9 in. A 42-in. diam table has infinitely-variable speed. (International Tool Co.)

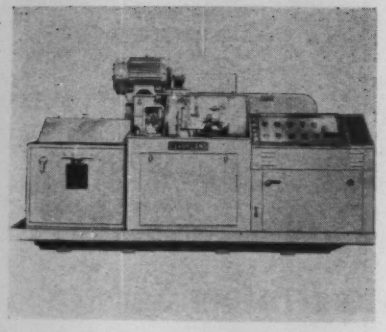
For more data circle No. 48 on postcard, p. 127



Cutting Torch Cuts Ferrous and Nonferrous Metals

Using the principle of ultra-high temperature plasma, a metalcutting torch cuts ferrous and nonferrous metals up to 4-in. thick and beyond. Even metals such as tungsten, molybdenum and tantalum are applicable. The plasma flame cutter uses argon, nitrogen and hydrogen mixtures. It operates with dc power supplies. Plasma velocities are over 10,000 mph. Temperatures are in excess of 50,000°F. Controls for gas mixtures, gas velocities and electric power are simple. They permit quick adjustment for metal thickness and for cutting speeds. (Thermal Dynamics Corp.)

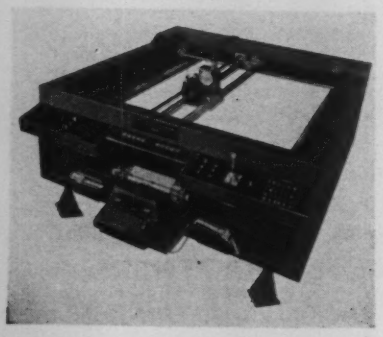
For more data circle No. 49 on postcard, p. 127



Unit Converts From Bar Work to Chucking Machine

Design changes in a single-spindle automatic machine increase the speed of setup and convenience of operation. A precision feed, monitor dial accurately indicates turret tool feed rates, in inches per minute. It does this for each forward and return setting of the turret tool. The unit is a combination bar and chucking machine. A simple turn of a knob sets the feed rates. Ten different infinitely-variable feeds are possible in one cycle of the machine. Conveniently located, a chart quickly transposes spindle speeds and feeds into dial settings. A simple turn of each knob sets the feed. (The Cleveland Automatic Machine Co.)

For more data circle No. 50 on postcard, p. 127



Digital X-Y Plotter Plots Exact Computer Data

Accurate to ±00.001 in. on a 48- x 48-in. plotting surface, an automatic plotter operates on a digital measurement basis. The digital logic eliminates warm-up time and all possibility of drift. Plotter inputs can come from punched cards, punched paper tape, keyboard or magnetic tape. Slewing speeds are 0.004, 0.08, 0.8 and 4 in. per second or faster. The print head has eight individually-operated print wheels and a pin to punch the precise location of the plotted point. If desired, the print head can be replaced by a routing or scribing tool to lay out printed circuit boards. (The Gerber Scientific Instrument Co.)

For more data circle No. 51 on postcard, p. 127

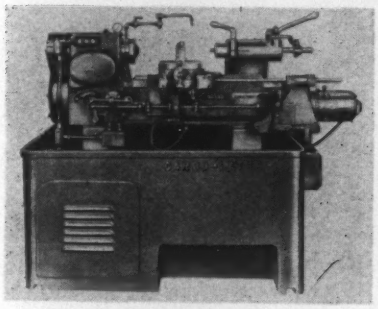
Tube Furnace

An electric combustion tube furnace incorporates a new type of power control. The tube furnace, which produces 2600° F maximum, provides a 12-in. uniform heat zone in a 2½-in. OD ceramic tube. The new power control uses thyratron electronic tubes. The thyratrons replace conventional contactors and saturable reactors. They allow greater accuracy of temperature control. (Despatch Oven Co.)

For more data circle No. 52 on postcard, p. 127

Compact Lathe

A compact lathe combines maximum high output with simplicity of design and a minimum of capital outlay. The complete work cycle can be controlled electrically in combination with air-operated front or back facer. Spindle and carriage



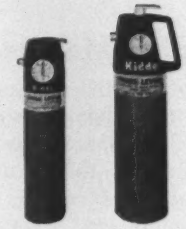
move to cutting position, automatically engaging mechanical feed. Carriage returns to loading position quickly. Operator can disengage or re-engage work for rapid, optional carriage travel set-up. (Burkhard Bros., Inc.)

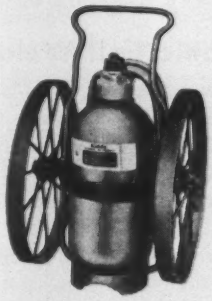
For more data circle No. 53 on postcard, p. 127

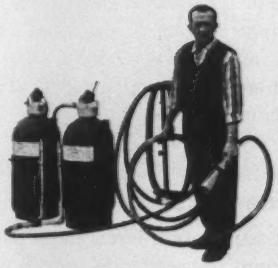
Finishing Machine

Of vibratory type, a finishing machine is designed especially for laboratory use and quantity production of small precision parts where finishing is required. The unit is particularly adapted for deburring, radii-forming, descaling, cleaning polishing of small parts, powdered metal gears, steel bushings. This portable unit is 18-in. long, 11-in. wide, 11½-in. high and weighs 29 lb. The ⅛ cu ft tub capacity may be rotated to any angular position

NOW! GET FULL-POWER FIRE FIGHTING WITH KIDDE'S DRY CHEMICAL LINE!







2½ and 5 pound pressurized units! Granted top rating by U.L., these two units pack the extra punch needed to get the jump on fire. For example, the 2½ pound Kidde unit is as compact as a 1 quart carbon tet model, yet is eight times as powerful! Both the 2½ and 5 feature simple, two-step operation, easy-to-read dust-and-moisture-proof gauges. 10 pound dry chemical also available.

20 and 30 pound pressurized dry chemicals! Both these Kidde units have the same good features of the 2½ and 5, plus some "extras" all their own. Center balanced for fast action, rugged diffuser horn, speedy trigger operation, recessed pressure gauge and enclosed mechanism.

200 pound dry chemical wheeled unit! Kidde's 200 pounder discharges a 40-foot stream faster, has an *extra* 50 pounds of fire-smothering dry chemical to knock down fire quicker. Low center of gravity and wide wheels make it easy to maneuver. Easy-to-use discharge control makes operation simple.

400 pound stationary unit! Here's maximum protection in a minimum package! Like all Kidde units, this features sure, dependable performance and fast, easy operation. Either wall-mounted or free standing, leakproof and tamperproof, exclusive Bridgeman Seal, universal long-range nozzle, easy-to-read pressure gauge. 200 pound model also available.

Get the jump on oil, gas and electrical fires! Learn more about the complete line of dependable, efficient Kidde equipment—write today!

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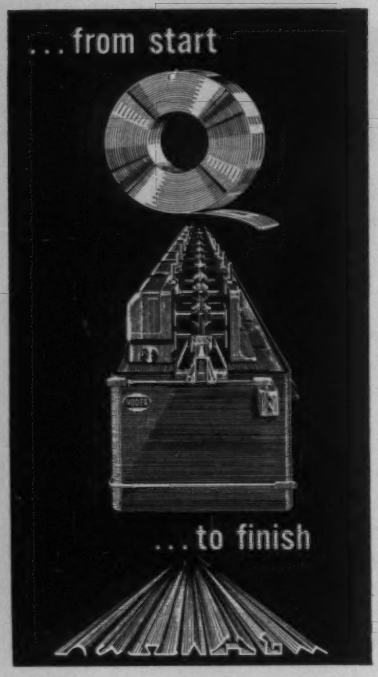

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Profits are available to you through the production of many shapes in metal... made with precision and economy on Yoder Cold Roll Forming Equipment.

Produce tubular, ornamental or structural shapes from a variety of metals in widths from a fraction of an inch up to 80 inches or more, and in stock up to ¾" thick. Your investment is comparatively modest, and with proven low operating costs, will give you one of the most profitable operations in your plant.

Experienced Yoder engineers will, without obligation, study your annual metal forming requirements. Many times they can point out that the installation of roll forming equipment would—even if operated only intermittently—soon justify its initial cost.

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ENGINEERING YODER MANUFACTURING COLD ROLL FORMING MACHINES

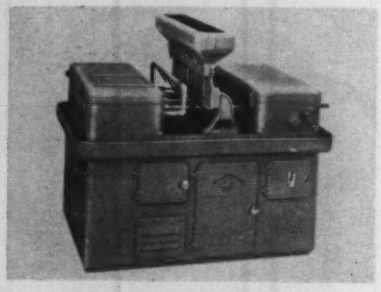
NEW EQUIPMENT

for dumping or screening. Amplitude of vibration is varied by the variable transformer, while the frequency is maintained at 3600 pulsations per minute. (Stevenson Co.)

For more data circle No. 54 on postcard, p. 127

Nut Tapping Machines

High - speed, fully - automatic, multi-spindle nut tapping machines require very little space. The machine easily adapts to the different requirements of cutting nuts. Easy accessibility and exchange-



ability of the various components facilitate the operation of the machine. The machine operates by the overrun boring principle. (Pan American Supply Co.)

For more data circle No. 55 on postcard, p. 127

Ultrasonic Foil Welder

A 10-w ultrasonic welder can spot weld foil in thicknesses ranging from 0.00025-0.002 in. It uses high-frequency vibrations to weld without heat or without materially deforming the metal. The unit produces welds that are as strong or stronger than the parent material. Hermetic seals are also provided. The spot welder is mounted in a trunnion on a heavy base and has a pneumatic operating system. (Gulton Industries, Inc.)

For more data circle No. 56 on postcard, p. 127

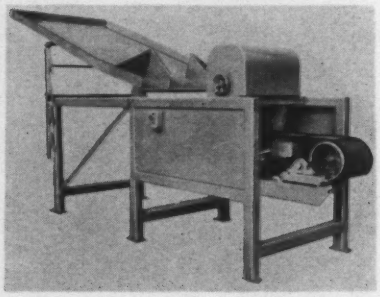
Impregnating Unit

For sealing powdered metal parts, a vacuum impregnating unit is also readily adaptable to impregnation of carbon, electrical and small die cast parts with various impregnants such as oil, wax. The process consists of a completely self-contained, low cost impregnating unit which uses a specially formulated resin. Powdered metal parts, regardless of density, can be rendered pressure-tight and non-absorbing with this unit. Internal contamination is not possible because pores throughout the metal part are completely filled with cured thermo-set plastic which remains permanently hard. There is no change in color, appearance or dimensions. (The National Sinter-Seal Co.)

For more data circle No. 57 on postcard, p. 127

Magnetic Separator

High-speed, mechanical separating of ferrous parts from finishing media is possible with a magnetic parts separating machine. It entirely eliminates hand-picking or screening. The unit has a variable-



speed output. Separation is accomplished by a permanent drum-type magnet. It pulls the parts up and out of the media mixture. It then deposits the parts on a moving conveyor belt for demagnetizing and delivery. (Rampe Mfg. Co.)

For more data circle No. 58 on postcard, p. 127

Sliding Bolster Presses

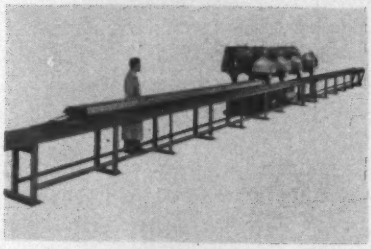
Sliding bolsters cut die change-over time from hours to minutes, on inclinable, straight side presses. Because dies glide or float on a cushion of air, they can be quickly moved into or out of working area. The presses are advantageous for production work requiring frequent die changes; also for tryouts of related operation setups in die shops. A power-operated slide adjustment permits the ready duplication of previous die settings. Hydraulically-actuated die clamps maintain the

clamping load mechanically in case of hydraulic or power failure. (Niagara Machine & Tool Works)

For more data circle No. 59 on postcard, p. 127

Buffing Machine

For surface finishing of long extrusions, an automatic reciprocating-type buffing machine consists of a conveyor and a series of buffing lathes. Mounted on the conveyor is a reciprocating work-holding



platen. Platen speed can be varied with a 3:1 variable-speed drive having a normal range of 15-45 fpm. A push-button control controls buffing wheel pressures. (Acme Mfg. Co.)

For more data circle No. 60 on postcard, p. 127

Mills Truncated Spheres

A machine represents a new approach to the machining of truncated spheres (ball studs). This machine can be completely automated to process parts on a high-production scale. Its rugged construction, heavy-duty components and unusual design of tooling and fixturing provide highly-accurate milling of the parts. The cutting tool uses two round carboloy blades or disks. Each blade is held in place by a clamp. This clamp also acts as a chip breaker. Automatic hydraulically-operated workpiece clamping and ejection eliminate manual operations. (Micromatic Hone corp.)

For more data circle No. 61 on postcard, p. 127

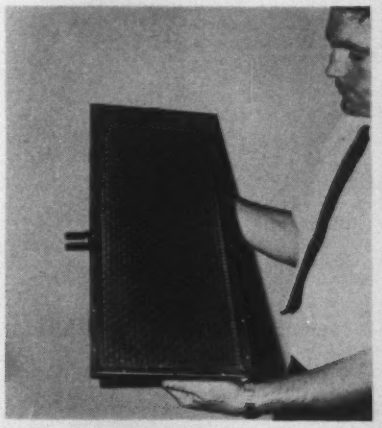
Vibrating Conveyor

Totally enclosed, an air-powered vibrating conveyor moves bulk quantities of pelleted metals without dust or contamination problems. A vibratory drive is air cushioned for quiet operation. It powers the aluminum conveyor which carries the material. Steady, rapid vibrations carry even the most brittle materials without chipping or breaking. Four coil springs provide support and isolate vibration from surrounding structures. The entire unit can be cleaned with common cleaning substances without damage to the conveyor or vibratory unit. (The Cleveland Vibrator Co.)

For more data circle No. 62 on postcard, p. 127

Infrared Heat

Completely controllable, a flameless, catalytic method produces low-temperature infrared heat. LP gas energy is directly converted to infrared heat energy on a catalytically active metal screen. The screen itself is the radiant heat source. Sur-



face temperature of the catalyst screen can be held automatically at any point between 800° and 1500°F. This is done by means of proportionate control of the gas flow. The panels are designed to provide heat rates between 2000

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HEAT & FLAME RESISTANT
WELDER'S GLOVES

SERVES THE SAME PURPOSE AS LEATHER GLOVES COSTING THREE TIMES AS MUCH!

Hundreds of very closely knitted loops per square inch prolong wear . . . offer flame and heat protection . . . increase manual dexterity. Perspiration will not harden or stiffen it.

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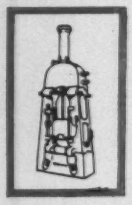
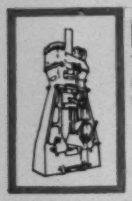
FOR FORMING MATERIALS BY IMPACT

CECO-DROP The most effective and economical gravity drop hammer. Air or steam operated. No boards to change, no back rods to lift. Safer, easier operation. Equipped with non-slip piston rod clamp, ram die-setting control and nylon-cushioned stroke control. New "Blowmatic" program controller for semi-automatic forging available. Sizes 500 lbs. to 10,000 lbs. Ask for Bulletin No. 80-L-7.



FORMING DROP

An air-operated, piston-lift, gravity-drop hammer designed especially for operations common to coining presses, compacting presses, strap hammers, pneumatic drop hammers, etc. May be operated manually, semi-automatic or completely automatic. Electric control system. Sizes 500 lbs. to 5000 lbs. Ask for Bulletin No. 73-L-7.



BOARD DROP HAMMER

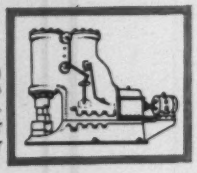
The best of the board drop hammers. Belt or motor drive. Unique board clamp arrangement and improved roll design promcte better board life, result in less down time. Unusual strength and rigidity. Sizes 100 lbs. to 5000 lbs. Ask for Bulletin No. 90-L-9.

CECOSTAMP

An air-operated impact drop stamp that produces a controlled blow or a "squeeze" instantly, at the will of the operator. Gives a permanent set to all the formable metals—even high strength alloys. Popular in iron foundries as inexpensive, highly productive tool for restriking malleable castings. Sizes from 21" x 18" platen area to 120" x 120" platen area. Ask for Bulletin No. 30-L-5.

STEAM DROP HAMMER

Designed to produce forgings at lowest cost per piece. Unique differential porting on Model "E" makes for the most efficient use of steam or air—greatest economy of power. Unusual strength and rigidity reduces down time, maintains alignment, increases production. Sizes 1000 lbs. to 16,000 lbs. Ask for Bulletin No. 55-L-4.

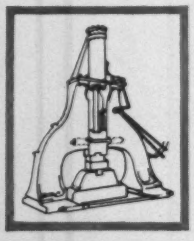


PNEUMATIC HAMMER

Popular motor-driven hammer with self-contained compressor, for flat-die or blacksmithing operations. Ideal for tool dressing, for research laboratory work, etc. An exceptional forging tool, independent of steam or air lines. Sizes 200 lbs. to 5000 lbs. Ask for Bulletin No. 16-L-9.

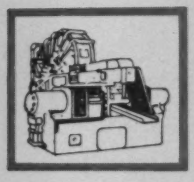
SINGLE FRAME HAMMER

High frame provides greater working space. Specially designed forged alloy steel dies ease stock manipulation. Power-saving cylinder cuts operating costs. Preferred for forging large discs and rings, upsetting high stems, etc. Ram guides supported on 5 sides. Sizes 750 lbs. to 6000 lbs. "Power/trol" power-assist controls on 2500 lb. hammers and larger. Ask for Bulletin No. 1-L-4.



DOUBLE FRAME HAMMER

Large working space for special or routine jobs. Well suited for making large rings, cogging and drawing out toughest alloy steels and high temperature "exotic" metals, making large axle forgings, etc. Heavy 15:1 anvil increases blow effectiveness. Sizes 2000 lbs. to 24,000 lbs. "Power/trol" power-assist controls on 3000 lb. hammers and larger. Ask for Bulletin No. 74-L-7.



THE IMPACTER & CECOMATIC FORGING

The revolutionary Chambersburg Impacter forges by means of horizontally-opposed rams striking the stock simultaneously from both sides. This new concept of the forging process makes possible the continuous, automatic production of drop forgings. Fully described in Bulletin No. 87-L-9.

TRIMMING PRESSES • R. R. WHEEL PRESSES • BUSHING PRESSES

CHAMBERSBURG ENGINEERING CO.

CHAMBERSBURG • PENNSYLVANIA

When it's a vital part, design it to be FORGED

NEW EQUIPMENT

and 12,000 btu per hour per square foot of emission surface. (Catalytic Combustion Corp.)

For more data circle No. 63 on postcard, p. 127

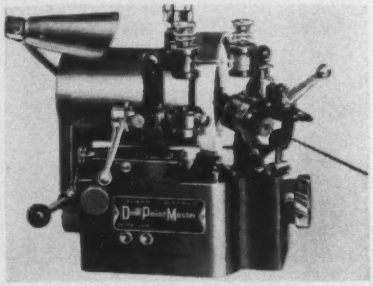
Chucking Machine

With air chuck mounted on a spindle, an automatic chucking machine handles irregularly-shaped parts. They may be forgings, castings, extrusions and cold-headed parts as well as simple slugs. The chuck has a 3-in. capacity and a 4-in. swing over the cross slides. Chuck jaw movement is 3/32 in. on diameter allowing over-the-head chucking where required. Spindle drive is by means of gears and chains from a 7½-hp motor. (Brown & Sharpe Mfg. Co.)

For more data circle No. 64 on postcard, p. 127

Drill Grinder

Ending small-hole drilling problems, a precision drill grinder can produce and reproduce any desired point on any drill from #80 to 0.250 in. diam. The grinder has independent adjustment of point angle, lip length and relief angle. Point angle is adjustable by degrees from 60°-180°; lip relief from 0°-26°. Point thinning is controlled to a thousandth of an inch by micrometer adjustments of wheel slide



and point thinning carrier. One collet chuck serves both sharpening and thinning positions without readjustment. (Leland-Gifford Co.)

For more data circle No. 65 on postcard, p. 127

Cleans Bearings

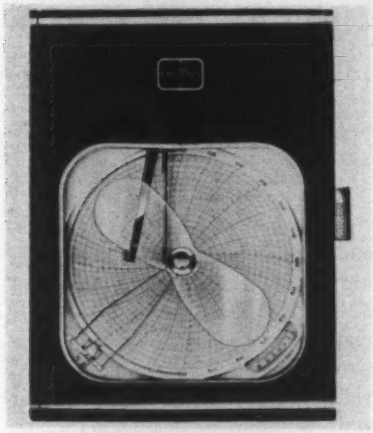
For ball and roller bearings, a machine cleans all types from ¼-7

in. OD. It uses only four sets of easily-changed universal tooling. It cleans by alternately forcing clean, pressurized solvent and air through the bearing while turning the bearings inner race. High solvent flow (up to 1½ gpm), along with sharp air blasts, combine with the internal churning to disintegrate and remove old lubricant. Besides removing the lubricant, it also takes away dirt particles. It does all this in 30 seconds. (Bearing Inspection, Inc.)

For more data circle No. 66 on postcard, p. 127

Recorder-Controller

Incorporated into a single unit, a recorder and controller reduce panel space requirements 50 pct.

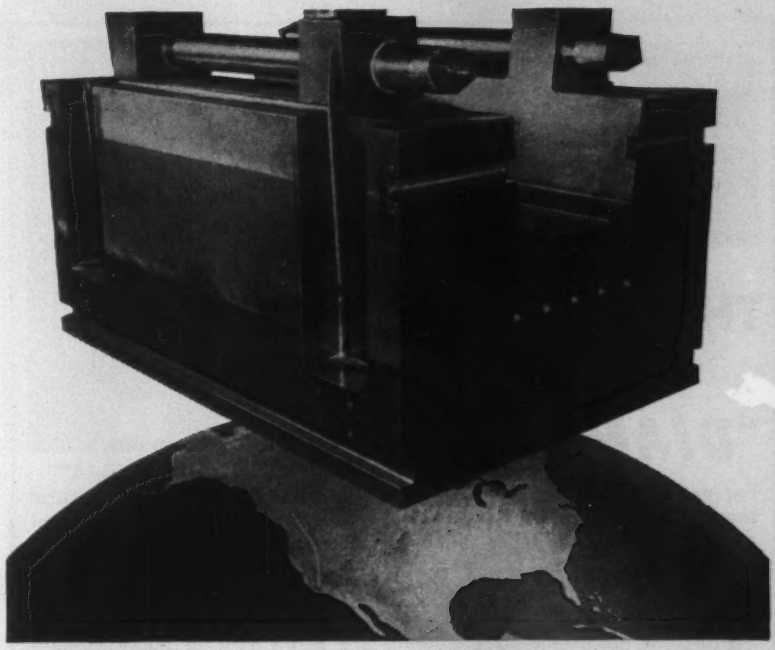


The recorder chart and the program cam are independently driven. This makes it possible to record repetitions of the program on a single chart. The program time may be from 30 minutes to 30 days. Various models of the single-case unit measure and control temperature, pressure, flow, liquid level and humidity. (The Bristol Co.)

For more data circle No. 67 on postcard, p. 127

Radial Drills

Three new models of radial drills have a 21-, 25- and 29-in. column with 7-, 8- and 10-ft arm, respectively. The machines feature electro-hydraulically, preselected speeds and feeds without stopping the machine. The machines have 32 speeds from 12-1500 rpm. The feed has an electromagnetic overload safety device. Push buttons control up and



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35 MILES UP*

TO MAKE THIS 36,000 POUND DIE HOLDER

*The Finkl Process of vacuum degassing steel in the ladle duplicates the atmosphere found at an altitude of 35 miles above the earth.

In this rarefied atmosphere, unwanted hydrogen, oxygen, non-metallic inclusions, and other impurities are literally boiled out of the molten steel, producing cleaner, tougher, stronger, more ductile, flaw-free products.

This 36,000 pound, 40" x 44" x 64" die holder is used in a heavy duty press. It was made of Finkl FX analysis, Temper 4, and finished machined in our shops.

All Finkl die blocks and hot work die steels are made from vacuum degassed electric furnace material produced in our own melt shop. Because of the clean, greatly improved qualities, you get more forging production, less downtime due to breakage, and savings in fewer tool regrinds.

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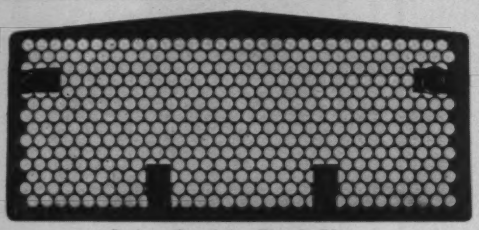
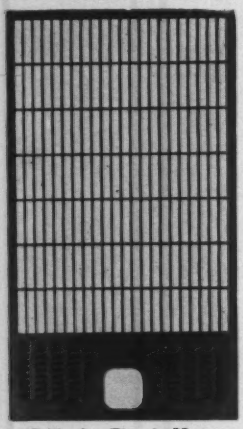


Rodent Guard for Electric Motor



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by letting

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For nearly half a century we have been furnishing perforated metal sheets, plates and parts to manufacturers of industrial equipment and household appliances, at lower cost than if the work were done in their own shops. No magic — just because we are especially equipped and organized for that type of work.

Let us quote on YOUR requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions and always welcome an opportunity to do so.

Our new 32-page catalog illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern applications. Write for Catalog 59. No charge or obligation.

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MANCO HYDRAULIC GUILLOTINE

for bend ductility tests and punching test slugs

A compact unit with bench stand for permanent mounting on laboratory bench tip. Provides 35 tons thrust for bend test to determine bend ductility of uncoated steel stock or the adherence and ductility of sheet coatings. Capacity up to .164 mild steel. Interchangeable punch tooling produces undistorted 3½" diameter blank slug from mild steel up to .067.

Available complete with power unit.

Write for Complete Information

MANCO Mfg. Co., BRADLEY, ILLINOIS

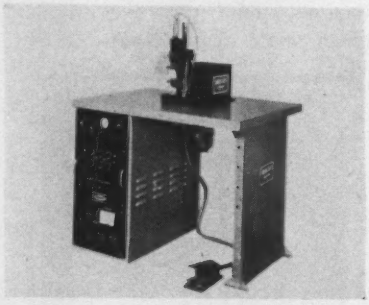
NEW EQUIPMENT

down movement of the arm, combined with automatic locking and unlocking of arm on column. (Hermes Machine Tool Co., Inc.)

For more data circle No. 68 on postcard, p. 127

Bench Welder

For welding small and delicate components of thin-gage material, a bench welder adjusts machine speed to operator's capability. Standard equipment includes a diaphragm head table mounted, ac, electrical and pneumatic controls



and welding transformer. The bench top is 30-in. deep, 42-in. long and 32-in. from the floor. A low-inertia diaphragm welding head, guided by two precision ball bushings, provides accurate electrode alignment and minimizes friction. (Sciaky Bros., Inc.)

For more data circle No. 69 on postcard, p. 127

Drying Equipment

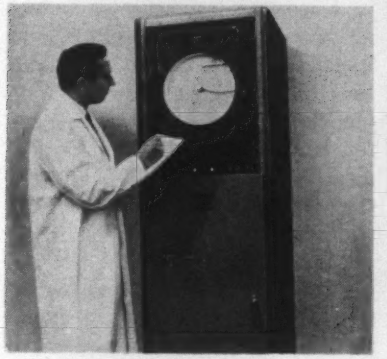
Drying all types of ambient atmospheres, a line of gas and air drying equipment ranges in capacity for flow rates to 1000 standard cu ft per minute. The dryers yield gases having dew points as low as —100°F. They permit continuous uninterrupted gas flows. (Advance Industries, Inc.)

For more data circle No. 70 on postcard, p. 127

Analyzes Water

An instrument provides continuous on-stream analysis of water. It duplicates continuously and automatically the principles of colorimetric analysis. In this way, it determines and records the amount of a specific component in water. A sam-

ple, piped into the instrument, is mixed with reagents. When silica is present, the sample turns blue. The

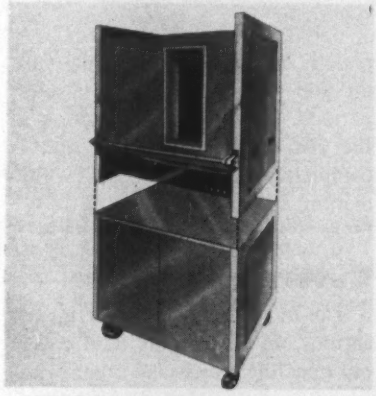


colorimeter measures the intensity of the color. A recorder records the measurement. (Hagan Chemicals & Controls, Inc.)

For more data circle No. 71 on postcard, p. 127

Test Chamber

With a testing space of 8 cu ft, a portable temperature test chamber operates from —100° to +750°F. Accuracy is to ±5°F. The heating and cooling rates are variable from 5°F per minute to 200°F per minute. Some of the fea-

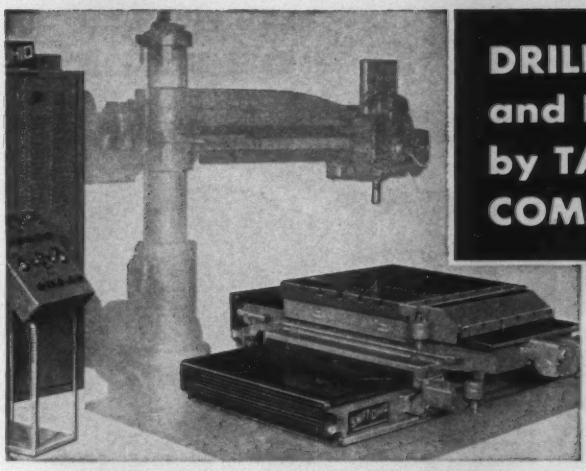


tures include: a vertical opening front door for complete inner access, solid state proportional electronic control; optional test tray inserts for front-door mounting. (Statham Instruments, Inc.)

For more data circle No. 72 on postcard, p. 127

Detects Flaws

Non-destructive testing equipment employs an oscilloscope presentation to indicate surface or sub-surface flaws in nonferrous, non-magnetic materials. The equip-



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Get .0015 In. Repeatable Accuracy

For Use With Radial Drills and Horizontal Boring and Drilling Machines

Handles drilling thrusts of 5000 lbs. Traverse rate is 150 in. per minute. Deflection, with work load, is .001 in. Absolute accuracy on drilled hole location is .0015 in.

This SWIFT OHIO table — which can be used with a variety of numerical positioning control units — is available in a variety of sizes and travel lengths.

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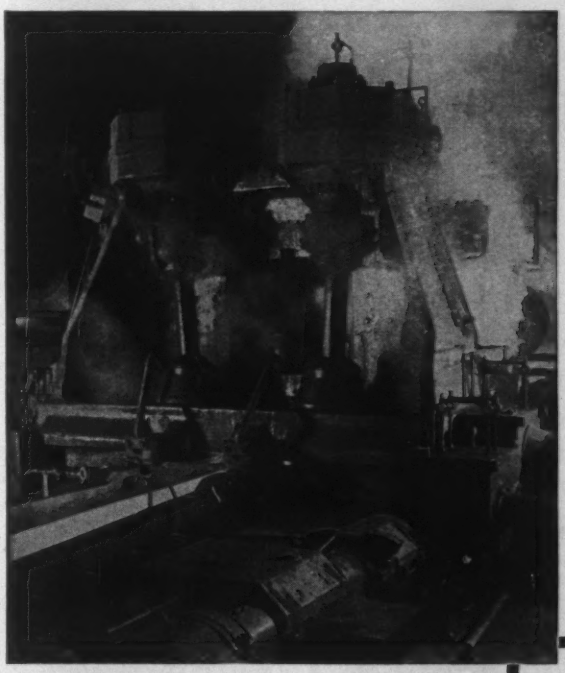
MULTIPLE-OPERATION EQUIPMENT FOR WELDING, MACHINING, ASSEMBLY, SPECIAL MACHINERY



Edging hot strip steel

No place for second-best equipment. That's why this heavy-duty vertical overdrive edger uses rugged Cone-Drive **double-enveloping worm** gearing to drive the vertical rolls continuously.

Rugged Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

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URICK'S FORMULA FOR BETTER GRAY IRON...

URITE*

**URITE—is poured in various grades with tensile strengths from 30,000 PSI to 60,000 PSI and, upon request, is alloyed to conform to customer specifications.*

FORMULA: **M + I + T + C + P = U = $**

M = Best Raw MATERIALS Regardless of Cost

I = Thorough INOCULATION

T = Good Basic Foundry TECHNIQUES

C = Constant CHECKS & CONTROLS

P = PRIDE of Workmanship (so often lacking today)

U = URITE, a Denser, Tighter, Tougher, Better Machining Iron

$ = Dollars in your pocket when you specify URITE castings.

Contact URICK, the foundry that starts with "U" and stays with you. Write for advanced technical data about URITE gray iron castings.

URITE CASTINGS

URICK FOUNDRY

ERIE, PENNSYLVANIA

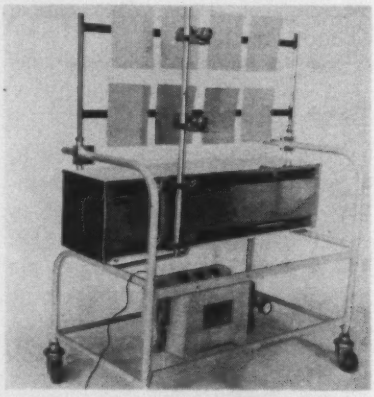
NEW EQUIPMENT

ment adapts to production-line use; or a separate inspection operation. At inspection speeds of 50-600 fpm, materials ⅛- to 3-in. diam can be inspected. Twenty-four plug-in coils adapt the equipment for interim sizes in ⅛-in. increments. (Magnetic Analysis Corp.)

For more data circle No. 73 on postcard, p. 127

Machine Sprays Panels

Used for production spraying of test panels of various sizes, a spraying machine is mounted on casters. The machine reciprocates spray guns back and forth in front of test

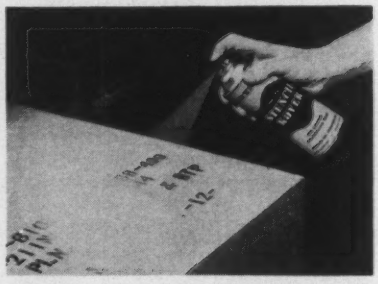


panels. At pre-determined intervals, the gun sprays and allows flash-off periods. It automatically stops at the end of the cycle. The unit is completely explosion-proof. (Spraymation, Inc.)

For more data circle No. 74 on postcard, p. 127

Covers Stencling

Tan in color to match corrugated cartons, an obliterating fluid covers old stencling, labels and other print-



ing. It dries instantly to transfer used cartons into fresh, clean, new looking containers. It also permits re-stencling on a new, clean surface.

The fluid also proves to be a quick, easy way to salvage over-runs of printed containers. The water-proof fluid comes in an aerosol container. (Reynolds Ink, Inc.)

For more data circle No. 75 on postcard, p. 127

Unit Inserts Wire

For use in wiring operations in fractional horsepower motors, a commutator connecting machine can turn out 65 motors per hour. It accomplishes this on #32 bar stock. Simple in operation, the machine operates on 50-60 psi air. It has a built-in lubrication unit and can be plugged to a 110-w line. The machine is mounted on a sturdy metal table that requires only 5 sq ft of space. (Warner Equipment Co.)

For more data circle No. 76 on postcard, p. 127

NEW BOOKS

"Transformers and Generators for Power Systems," by R. Langlois-Berthelot, is written for the engineering student who has a genuine knowledge of physics; also for the engineer concerned with design and manufacture; and for the operating engineer. The text is divided into two parts. The first part deals with the transformer. The second part deals with the synchronous machine. The figures and references are numbered separately. One of the appendices includes a complete survey of the articles referring to the subject that have appeared in British, American and French engineering journals. 541 pages. $12.00. Philosophical Library, Inc., 15 E. 40th St., New York.

"Mineral Facts and Problems," by the staff, Bureau of Mines, contains up-to-date facts. The outlook and the problems which concern minerals have been reappraised. Emphasis has been placed on balanced and uniform coverage of dif-

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NEW BOOKS

ferent commodities to enhance the use of the volume for comparative studies of minerals. The book should prove valuable to those who must obtain information on mineral commodities, but who lack the time for thorough professional searching. The back of the book contains an index and information finding guide. Included in this is a listing of mineral industry companies and process developers. Constituting the chapters of this volume are 87 statements for specific commodities that assess the national position and problems for metals, minerals and mineral fuels. The 87 commodity chapters are arranged alphabetically by commodity. 1015 pages. $6.00 (cloth). Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

"Comparison Test of Reinforcing Steels," WT-1473, covers the results of a series of experiments conducted relative to the merits of hard and intermediate grade steel. An example is reinforcement in concrete slabs when subjected to blast loading. 108 pp. $2.25. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

"Energy in the American Economy, 1850-1975," by Sam H. Schurr, Bruce C. Netschert with Vera F. Eliasberg, Joseph Lerner and Hans H. Landsberg, presents a comprehensive study of energy's role in the United States. The book consists of three parts. Part I is an analytical history of the more than a century in which fuel dominance shifted from wood to coal, from coal to oil and gas and saw the rise of electrification. Part II is an assessment of future demands for energy. Part III assesses future energy supply. 774 pages. $12.50. The John Hopkins Press, Homewood, Baltimore 18.

January Should Bring an Upturn

It won't be anything to shout about, but January should bring a mild upturn in operations.

Meanwhile, December orders are low and may result in it being the low point of the entire steel recession.

■ January steel production may show the first upturn since last June. Steelmakers are encouraged by scattered indications of a better order volume for production after the first of the year.

A cautioning word: The upturn can not be considered the first step of a major recovery. Instead, the improvement will be the effect of seasonal factors coming after a depressed December.

December Low Point — Orders for December are at a low ebb. In addition, many plants are contemplating complete shutdowns this month for days at a time. These factors may make December the low point of the entire recession period for the steel industry.

The January upturn will be based primarily in improved automotive orders, balancing of low steel inventories, and seasonal improvement among some steel consumers.

Modest Gains—But even so, the January pickup will be a modest one, and reminiscent of many of the false starts that have encouraged, then let down, the hopes of the industry at intervals since last June.

Most of the improvement will be in automotive centers, with January now shaping up as a "fairly decent month." This is on the basis of orders placed by automakers for their January production.

In contrast, steel shipments to automakers in December will be close to the low point for the year. But in Detroit, the feeling is that once the year-end situation is out of the way, there will be a more regular pattern of steel ordering.

Orders Still Slow—Except for the automotive factor, there is little to cheer about in advance ordering. Current reports indicate orders are still no stronger than enough to sustain operations of 45 to 47 pct of capacity—about the current operating rate. This will be reflected in low operations throughout the month.

Meanwhile, Dec. 1, when wages went up under terms of the steel labor contract, passed with little or no notice—and no price changes. Nor are any looked for in the near future. Smaller companies and those which have been hit adversely by their product mix are having a hard time staying in the black.

Less Than 100 Million — But with the industry hard-pressed to hold its price line, there is little chance for relief until operations recover.

As it stands now, the steel industry will not produce 100 million tons this year. The low rate of December operations will probably put the total for the year at 98 to 99 million tons.

The poor December rate is also due in part to the automotive picture. It is apparent that automakers cut their schedules this month in order to solve some of their high inventory problems.

Steel Operating Rates

	This Week	Week Ago	Month Ago	Year Ago
North East Coast	51.0	51.0*	54.0	102.0
Buffalo	42.0	45.0*	54.0	100.0
Pittsburgh	44.0	46.0*	48.0	97.0
Youngstown	36.0	37.0*	38.0	94.0
Cleveland	46.0	50.0*	57.0	96.0
Detroit	61.0	61.0*	68.0	99.0
Chicago	51.0	52.0*	51.0	97.0
Cincinnati	51.0	50.0*	57.0	93.0
St. Louis	65.0	61.0*	75.0	115.0
South	54.0	55.0*	53.0	92.0
West	51.0	48.0*	50.0	95.0
U. S. Rate	48.3	48.9	51.5	96.5

*Revised

Steel Output, Composite Prices

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,376	1,393	1,468	2,732
Ingot Index				
(1947-1949=100)	85.7	86.7	91.4	170.1
Composite Prices				
Finished Steel, base (cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.32	$66.32	$66.32	$66.41
Scrap No. 1 hvy (Gross ton)	$28.50	$28.50	$28.17	$42.50
No. 2 bundles	$18.50	$18.50	$18.50	$28.83

Oven Industry Is Bogged Down

Sales of industrial ovens generally moved sideways this year. In some cases they were even less than 1959.

An IRON AGE survey of oven manufacturers reveals that 1961 doesn't look promising.

■ Like so many others, the industrial oven industry appears to be bogged down.

A recent IRON AGE survey of leading manufacturers reveals that 1960 sales increased only slightly over last year. One manufacturer, in fact, says sales were "appreciably lower than anticipated and less than in 1959."

And the outlook for 1961 doesn't seem to be much better. Nearly 75 pct of the manufacturers surveyed report that they expect sales next year to remain about the same as 1960. The few that do look for increases figure the margin to be between 5 and 10 pct.

Soft Prices—Also, the price outlook for next year is generally soft. If prices go up at all, it will be reflected in gradual increases but nothing drastic.

With no great demand facing manufacturers, inventories are low. This is largely due to cutbacks in production rather than any great influx of orders. Hand-in-hand with this, delivery dates are normal.

The average delivery dates on some units, for example are: Standard ovens, four to six weeks; special ovens, 10 to 14 weeks; standard furnaces, four to six weeks; and special furnaces, 16 to 20 weeks. Other products, such as electrically heated jackets, have delivery dates of six to eight weeks after the customer approves the design drawings.

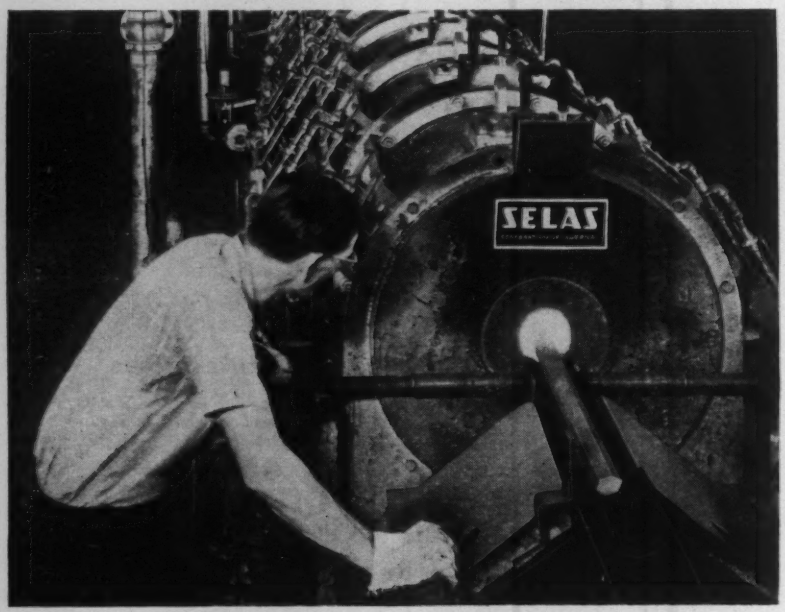
Mixed Backlogs — The backlog situation among oven manufacturers is mixed. Where one reports that "Our backlog position is down approximately 45 pct from that of last November. . .," another says, "Our backlog at the present time is approximately 20 pct better than one year ago." Generally, however, backlogs appear steady but leaning downward.

Only a few new developments are expected to appear on the oven market in the next few years. Further improvement in mechanical or automated equipment, power convection, and higher quality prepared atmospheres could have a market bearing soon.

Of importance to manufacturers, too, is current research in higher temperature ovens. One producer told The IRON AGE, "Higher temperatures are being required all the time and new refractories and refractory metals are being developed for this purpose as well as new techniques for applying them to furnaces."

Another Area—There is also research underway in the fields of solid state devices or transistors including equipment for crystal growing, zone refining, and gaseous diffusion.

Though new developments aren't expected in the immediate future, oven manufacturers realize they must come up with cost-saving units.



BOGGED DOWN OVENS: The industrial oven industry appears to be bogged down with sales almost the same this year as in 1959. Manufacturers hope, however, that new developments will boost sales. Research is now underway in such areas as high temperature ovens and automation.

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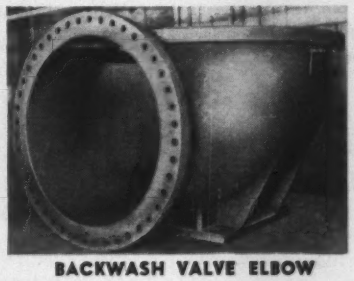

BACKWASH VALVE ELBOW

Weight: Rough—10320 lbs. Finished—9470 lbs. Main Flange: 90¼" O.D., 79¼" I.D. Nozzle Flange: 59½" O.D., 48" I.D. 58"F/F 52" C/F of Nozzle

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Stainless Use in '67 Projected by Inco

Automotive uses will still lead in tonnage, aided by some new developments.

But construction and contractors products will grow at a more spectacular rate, study shows.

■ Automotive markets will be buying 181,700 tons of stainless steel in 1967—a 60 pct increase in 10 years. The industry used 110,848 tons in 1957.

This prediction is contained in one of the latest studies of specific markets for stainless steel conducted by International Nickel Co. Other recent studies cover construction and contractors products, hand tools, and agricultural machinery.

The Leader—Largest automotive tonnage will be in the form of cold-rolled strip. It's used primarily for decorative trim. Inco expects it to account for 166,349 tons in 1967.

However, new applications are also expected to increase demand for stainless. In general, these will be functional in nature. They include commercial development of gas turbine engines, mufflers and tailpipes, and anti-smog devices.

Big Gains — Construction and contractors products will still offer a smaller market than automotive in 1967. However, increase over present usage will be more spectacular. This market will take 109 pct more stainless in 1967 than it did in 1957, the report predicts. Tonnage will be up to 108,600 tons from 51,966 tons.

Major stainless mill shapes for construction will be cold-rolled sheets and strip, Inco says, with somewhat smaller tonnages of plates, tubing and bars.

Applications will include swimming pool accessories and playground equipment, gutters and downspouts, storm windows and doors, curtain wall panels, control panels, canopies, louvers, grills, handrails, and builders' hardware.

Other Markets—For hand tools, Inco predicts a growth of only 24 pct in sales during the period. This would put the total at about 600 tons. And 73 pct of this is expected to be cold-rolled strip.

Use of stainless for agricultural machinery is expected to double from the 1957 base. The study predicts 2140 tons will be used by this industry in 1967. In 1957 it used 1077 tons. Major item: Cold-rolled sheets, for corrosion resistance.

Sheet and Strip—As far as the industry is concerned, December will be a washout. From all indications, it will be the lowpoint of the year. Great Lakes Steel Corp., **Detroit,** plans to halt steelmaking operations from Dec. 24 to Jan. 3, unless orders pick up sharply. Finishing and shipping operations would resume Dec. 27, however. Automotive ordering for January looks like an improvement over both November and December. Appliances continue to lead the way in January bookings of **Chicago** mills.

Wire—Output remains at about 50 pct of capacity. **Cleveland** mills say forward buying is practically nonexistent, so production rates are hard to gauge. From the pattern of small, rush orders coming in, it is certain that some users have no inventory on hand.

Bars—Mills will have to receive 15 to 20 pct more orders if December shipments are to equal November, according to **Pittsburgh** reports. But this isn't out of line with the pattern of the past few months; mills have been getting that percent of their business after the month starts. Customers continue to avoid advance commitments. And orders are placed by the week, rather than by the month. Producers are fighting it out in **Detroit** for the cold-drawn bar market, but there still aren't any signs of growing strength. Farm equipment isn't showing any strength in the **Midwest.** However, some mills around **Chicago** notice a slight improvement shaping up for cold-drawn bars for January.

Plates and Shapes—Improvement is showing up in spots. How long it will last isn't known. An **East Coast** mill says November was its best month of the year for structurals. And structural orders placed in **Detroit** for November and December compare favorably with September and October. **East Coast** plate market will get a boost out of a contract for four cargo ships awarded to Sun Shipbuilding and Dry Dock Co. Submarine programs are taking good tonnages. And the recent awarding of a new aircraft carrier contract to Newport News will boost demand soon, aiding **Pittsburgh** mills as well. And mild gains in linepipe projects will aid mills in **Chicago** and other areas of the **Midwest.**

PURCHASING AGENT'S CHECKLIST

Molybdenum widens its market applications. P. 82

More small companies turn to electronic data processing to speed paperwork. P. 83

How to get more from your metalworking dollar—special machining. Starts on p. 109

COMPARISON OF PRICES

(Effective Dec. 6, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Dec. 6 1960	Nov. 29 1960	Nov. 1 1960	Dec. 8 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stain'l's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Dec. 6 1960	Nov. 29 1960	Nov. 1 1960	Dec. 8 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.11	$70.11	$70.11	$70.57
Foundry, South Cin'ti	71.92	71.92	71.79	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	69.61	69.61	66.91	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.32	$66.32	$66.32	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$26.50	$26.50	$26.50	$42.50
No. 1 steel, Phila. area	33.50	33.50	32.50	44.50
No. 1 steel, Chicago	25.50	25.50	25.50	40.50
No. 1 bundles, Detroit	21.50	21.50	21.50	40.50
Low phos., Youngstown	28.50	28.50	27.50	49.50
No. 1 mach'y cast, Pittsburgh	44.50*	45.50	45.50	55.50
No. 1 mach'y cast, Phila.	47.50	47.50	48.50	54.50
No. 1 mach'y cast, Chicago	41.50	41.50	41.50	60.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$28.50	$28.50	$28.17	$42.50
No. 2 bundles	18.50	18.50	18.50	28.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	30.00	33.00
Copper, Lake, Conn.	30.00	30.00	30.00	33.00
Tin, Straits, N. Y.	102.50†	102.75	104.00	99.00
Zinc, East St. Louis	13.00	13.00	13.00	12.50
Lead, St Louis	11.80	11.80	11.80	12.80
Aluminum, ingot	26.00	26.00	26.00	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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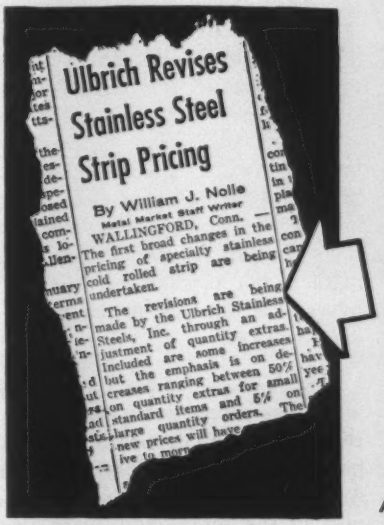
* Appears in the Dec. 1-Dec. 15 issues.


Ulbrich Revises Stainless Steel Strip Pricing

By William J. Nolle
Metal Market Staff Writer

WALLINGFORD, Conn. — The first broad changes in the pricing of specialty stainless cold rolled strip are being undertaken.

The revisions are being made by the Ulbrich Stainless Steels, Inc. through an adjustment of quantity extras. Included are some increases but the emphasis is on decreases ranging between 50% on quantity extras for small standard items and 5% on large quantity orders. The new prices will have

From "American Metal Market" July 14, 1960.

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Port Areas Eye Japanese Orders

Scrapmen in coastal areas should see increasing export activity during the first quarter.

Japan has ordered more than one million tons for delivery before March. Inland areas, however, are still inactive.

■ Scrapmen in port areas are looking ahead to the first quarter and activity that should result from new Japanese commitments for more than one million tons of scrap prior to March.

But inland dealers and brokers still study an inactive market.

Reports say that 95 cargoes will head for Japan during the first quarter. This increases by 30 pct the export activity in that direction during the fourth quarter of this year. Houston and West Coast dealers are expected to pick up about 40 pct of the new orders. The bulk of the rest will probably come from the New York and Philadelphia ports.

How much affect the new orders will have on prices remains to be seen. The Japanese use formula pricing, so domestic demand will still be the key factor.

The effective date of Nov. 28, 1960, which appeared for scrap prices in the Dec. 1 issue, was incorrect. It should have read Nov. 29, 1960.

Pittsburgh—Brokers are showing new interest in scrap at current prices and the market looks a little firmer. On a local auto list, factory bundles brought slightly more than last month and attracted lively broker interest. However, there is no evidence that consumers are ready to support a price advance. A mill on the fringe of the district is paying $27 to the dealer for No. 1 heavy melting. This is the same as last month's price for the mill.

Chicago—Prices are up slightly as new factory bundle lists closed at mildly stronger prices than did the first lists of the month. Reduced auto bundle output, plus normal dropoffs in other industries during the holiday season, are cited as factors rather than any real gain in mill buying. Orders still seem a little more difficult to cover than was the case two weeks ago.

Philadelphia — Though domestic activity is again slow, exports are enough to sustain the market on an even keel. Scrapmen report that four ships are scheduled to load this month. Also, Japanese orders for the first quarter should mean a slight pickup in the overall area market, but demand by domestic buyers will still have the large bearing on prices.

New York—The market appears somewhat more stable this week. But dealers say this means only that prices are teetering less than last week. Export is still the sole support of the scrap industry in this area. Supplies are mounting in the quiet turnings market and demand, if anything, has taken a soft turn. New turnings prices are on appraisal.

Detroit — It's a steady market with final December industrial lists in. A major mill came out with a small order for No. 1 bundles, good through Dec. 15. The mill is closing down Dec. 23 for a long holiday. One scrap buyer from Texas and another from Chicago came into the Detroit market to lay down export material until the spring shipping season.

Cleveland—The market shows a few signs of firmness. At least no further decline is in sight for the present time. But there's no upswing either. Area auto lists held their own, and rails show a slight increase over last week.

Cincinnati—An area mill bought small tonnage at the same price as a month ago. Dealers will sell only small amounts at the present levels. Area production lists went for $24.50 on cars and will be partially laid down and partially shipped out of the district.

St. Louis—The market is slow and dull with only small tonnages changing hands. Most prices are unchanged.

Birmingham—A large Birmingham electric furnace returned to the market with sizeable orders. This raised prices $2 per ton on electric furnace bundles and No. 1 busheling. Otherwise the market continues at a slow pace.

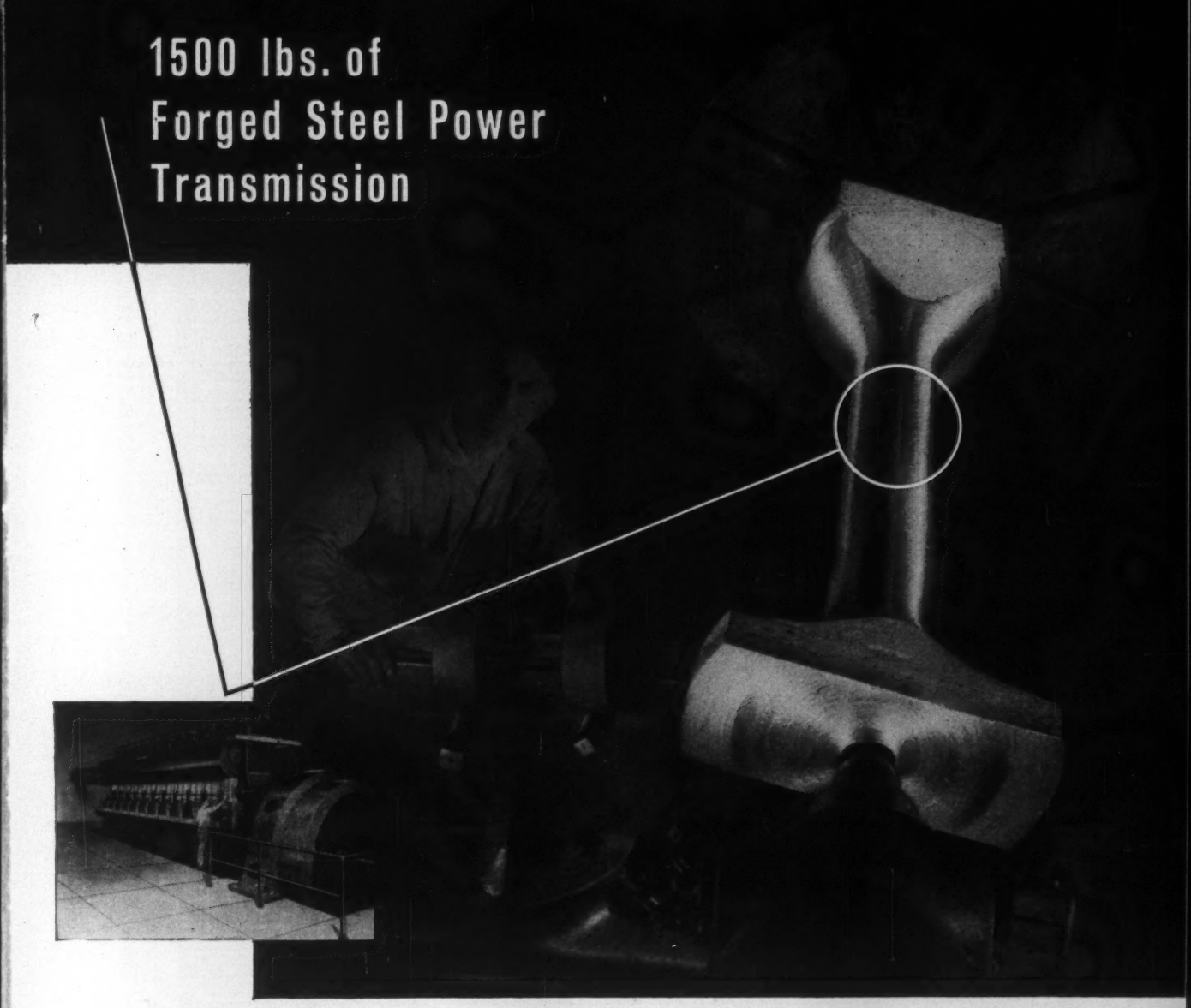
Buffalo—A sale of No. 1 cupola cast was made at $36 to $37. All other prices are unchanged.

Boston—It's still a dull market, but a little export keeps it alive. December is expected to remain quiet, but there are hopes that January will bring additional activity.

West Coast—Japan stepped up its orders for the first quarter. The estimates call for 270,000 tons of scrap to leave Farwest ports during that period. However, the present situation is still lifeless.

Houston—The market retains a status quo with no real activity. Export, particularly to Mexico, is providing a small prop. However, Japanese commitments tend to make exporters predict first quarter improvements.

1500 lbs. of Forged Steel Power Transmission



This 1500 lb. forged steel diesel engine connecting rod is taking a "dressing down". At working weight (1400 lbs.) it will transmit horse power in a municipal power plant. Another photographic example of the diverse sizes and weights of component parts going through our forge shops daily. You are assured of the same engineering and metallurgical quality control, the same careful craftsmanship which characterize steel forgings weighing 80 tons and more, when you place with us the responsibility for making any size forged steel component part.

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ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

SCRAP PRICES *(Effective Dec. 6, 1960)*

Pittsburgh

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	27.00 to 28.00
No. 1 factory bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	26.00 to 27.00
Machine Shop turn.	11.00 to 12.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	15.00 to 16.00
Low phos. punch'gs plate	32.00 to 33.00
Heavy turnings	23.00 to 24.00
No. 1 RR hvy. melting	31.00 to 32.00
Scrap rails, random lgth.	40.00 to 41.00
Rails 2 ft. and under	45.00 to 46.00
RR specialties	36.00 to 37.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	85.00 to 90.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	25.00 to 26.00
No. 1 factory bundles	28.00 to 29.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	25.00 to 26.00
Machine shop turn.	10.00 to 12.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	12.00 to 13.00
Low phos. forge crops	36.00 to 37.00
Low phos. punch'gs plate, ¼ in. and heavier	33.00 to 34.00
Low phos. 2 ft. and under	31.00 to 32.00
No. 1 RR hvy. melting	29.00 to 30.00
Scrap, rails, random lgth.	37.00 to 38.00
Rerolling rails	48.00 to 49.00
Rails 2 ft. and under	42.00 to 43.00
Angles and splice bars	38.00 to 39.00
RR steel car axles	48.00 to 49.00
RR couplers and knuckles	35.00 to 36.00
No. 1 machinery cast.	41.00 to 42.00
Cupola cast.	36.00 to 37.00
Cast iron wheel	27.00 to 28.00
Malleable	40.00 to 41.00
Stove plate	31.00 to 32.00
Steel car wheels	35.00 to 36.00
Stainless	
18-8 bundles and solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 bundles and solids	75.00 to 80.00
430 turnings	40.00 to 45.00

Philadelphia Area

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast, chem. borings	23.00 to 24.00
Low phos. 5 ft and under	35.00 to 36.00
Low phos. 2 ft punch'gs	38.00 to 39.00
Elec. furnace bundles	34.00 to 35.00
Heavy turnings	25.00 to 26.00
RR specialties	36.00 to 37.00
Rails, 18 in. and under	47.00 to 49.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	36.00 to 37.00
Cast iron car wheels	37.00 to 38.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	47.00 to 48.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.50 to $23.50
No. 2 hvy. melting	19.50 to 20.50
No. 1 dealer bundles	23.50 to 24.50
No. 2 bundles	15.00 to 16.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Low phos. 18 in. and under	31.00 to 32.00
Rails, random length	35.00 to 36.00
Rails, 18 in. and under	42.00 to 43.00
No. 1 cupola cast	34.00 to 35.00
Hvy. breakable cast.	28.00 to 29.00
Drop broken cast	41.00 to 42.00

Youngstown

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	21.00 to 22.00
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	28.00 to 29.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Cleveland

No. 1 hvy. melting	$23.50 to $24.50
No. 2 hvy. melting	17.00 to 18.00
No. 1 dealer bundles	23.50 to 24.50
No. 1 factory bundles	27.00 to 28.00
No. 2 bundles	16.50 to 17.50
No. 1 busheling	23.50 to 24.50
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft. & under	30.00 to 31.00
Low phos. punch'gs plate	24.50 to 25.50
Drop forge flashings	23.50 to 24.50
Foundry steel, 2 ft. & under	25.00 to 26.00
No. 1 RR hvy. melting	28.00 to 29.00
Rails 2 ft. and under	44.00 to 45.00
Rails 18 in. and under	45.00 to 46.00
Steel axle turnings	20.00 to 21.00
Railroad cast.	41.00 to 42.00
No. 1 machinery cast.	41.00 to 42.00
Stove plate	36.00 to 37.00
Malleable	43.00 to 44.00
Stainless	
18-8 bundles	165.00 to 170.00
18-8 turnings	60.00 to 70.00
430 bundles	70.00 to 75.00

Buffalo

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 busheling	23.00 to 24.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	11.00 to 12.00
Low phos. plate	31.00 to 32.00
Structurals and plate, 2 ft. and under	33.00 to 34.00
Scrap rails, random lgth.	32.00 to 33.00
Rails 2 ft. and under	42.00 to 43.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	36.00 to 37.00

St. Louis

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	25.00 to 26.00
Foundry steel, 2 ft.	27.00 to 28.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	18.00 to 19.00
Machine shop turn.	6.00 to 7.00
Shoveling turnings	8.00 to 9.00
Cast iron borings	16.00 to 17.00
No. 1 RR hvy. melting	28.00 to 29.00
Rails, random lengths	35.00 to 36.00
Rails, 18 in. and under	37.00 to 38.00
RR specialties	33.00 to 34.00
Cupola cast	38.00 to 39.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	33.00 to 34.00
Cast iron cars wheels	33.00 to 34.00
Rerolling rails	44.00 to 45.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	31.00 to 32.00
Elec. furnace, 3 ft. & under	32.00 to 33.00
Bar crops and plate	37.00 to 38.00
Structural and plate, 2 ft.	36.00 to 37.00
No. 1 RR hvy melting	30.00 to 31.00
Scrap rail, random lgth.	35.00 to 36.00
Rails, 18 in. and under	44.00 to 45.00
Angles and splice bars	36.00 to 37.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	45.00 to 46.00
Cast iron car wheels	33.00 to 34.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	19.00 to 20.00
No. 2 dealer bundles	14.00 to 15.00
Machine shop turnings	3.00 to 4.00
Mixed bor. and turn.	4.00 to 5.00
Shoveling turnings	6.00 to 7.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakable cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$18.00 to $19.00
No. 2 hvy. melting	15.00 to 16.00
No. 1 dealer bundles	21.00 to 22.00
No. 2 bundles	14.00 to 15.00
No. 1 busheling	18.00 to 19.00
Drop forge flashings	18.00 to 19.00
Machine shop turn.	6.00 to 7.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	9.00 to 10.00
Heavy breakable cast.	23.00 to 24.00
Mixed cupola cast.	29.00 to 30.00
Automotive cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	145.00 to 150.00
18-8 turnings	45.00 to 50.00
430 bundles and solids	50.00 to 55.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	18.00 to 19.00
No. 1 dealer bundles	22.00 to 23.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	22.00 to 23.00
Machine shop turn.	3.50 to 4.50
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	29.00 to 30.00
Heavy breakable cast.	25.50 to 26.50

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	18.00
Machine shop turn.	14.00
Cast iron borings	14.00
No. 1 cupola cast.	46.00 to 48.00

Los Angeles

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	17.00
Machine shop turn.	12.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furnace 1 ft. and under (foundry)	40.00
No. 1 cupola cast.	37.00 to 38.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont

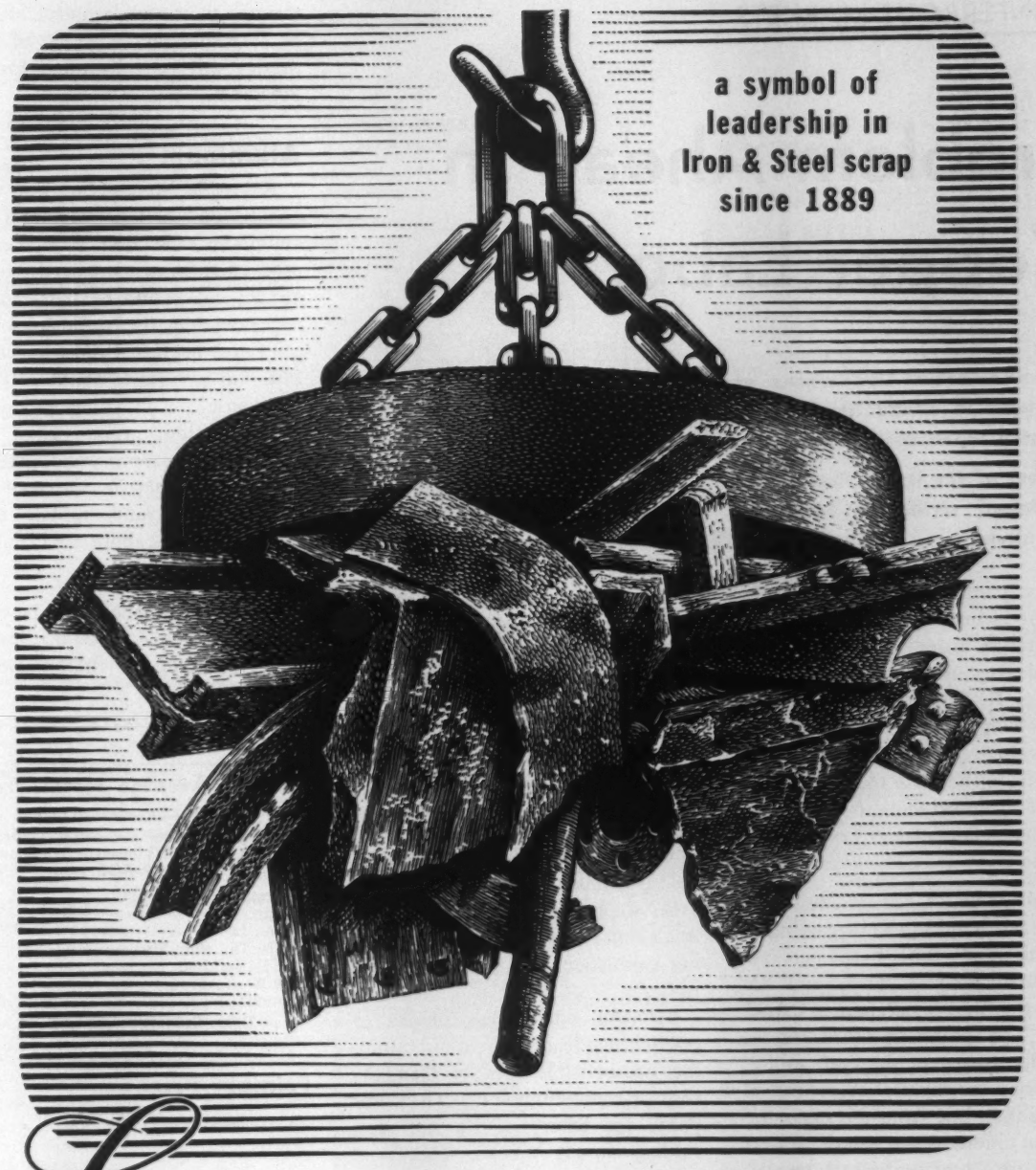
Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$24.00
No. 2 hvy. melting cut 3 ft. and under	22.50
No. 1 dealer bundles	24.00
No. 2 bundles	17.00
Mixed steel scrap	16.00
Bush., new fact, prep'd	23.00
Bush., new fact, unprep'd	18.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	30.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 2 bundles	20.50
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft. & under	$40.00 to 41.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00



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Problem Ahead In Copper Labor

Kennecott's Cox warns of problems in conducting copper industry labor negotiations.

Most of the issues that led to prolonged strikes in 1959 are still alive.

■ The perennial problem of copper producers—labor relations—got a thorough airing last week by one of the key men in the industry, Charles R. Cox, president of Kennecott Copper Corp.

His discussion of the 1959 strikes is pertinent because the same problems are almost sure to exist when the current contracts expire this summer.

Too Many Units — The basic problem: "Collective bargaining is difficult at any time, but it becomes a Herculean task when you are dealing with 36 bargaining units."

Mr. Cox pointed out that for the first time many of the craft unions bargained for themselves instead of taking their cue from the major industrial unions. Since almost all were trying for "preferential treatment," this served to make negotiations more complex.

On economic issues, the major unions — International Union of Mine, Mill and Smelter Workers, and United Steelworkers of America—simply tried to outdo one another, says Mr. Cox.

On other issues the unions were in conflict with each other.

Prolonged Bargaining — How much did this confusion affect the length of the strike? Mr. Cox points out, "While the first agreements were reached within about three months of the start of the strike, it wasn't until seven months later that the last of the contracts had been signed. The strike itself lasted almost six full months. Collective bargaining had been carried on for about 15 months."

What's the answer?

Management's obligations, says Mr. Cox, includes working with union leadership in encouraging all attempts to bridge the existing gap. And, more pointedly, Mr. Cox insists that management must "learn as much about labor unions as any other part of our business."

Union Responsibility—Unions, he says, must "develop a high degree of professional administration at all times, not just during organizing campaigns and negotiating periods."

He also admonishes unions to provide real leadership in discouraging irresponsible acts by membership or representatives. "The company, for example, can not stop raiding among unions. This is a problem that must be solved by the unions and their membership."

In the way of specific action, Mr. Cox finds some merit in the plan of Arthur Goldberg, counsel to the United Steelworkers for a permanent National Council of Labor Management Advisors. This group would not legislate, but would recommend in specific problems such as economic growth and automation displacements.

Mr. Cox warns, "If leadership in management and the unions fail to accomplish satisfactory results through their own initiative, we can be sure that the judgment of third parties will be substituted for our judgment."

Aluminum

Reynolds Metals Co. last week announced another conquest for aluminum cans. Five Florida citrus processing firms announced the aluminum can would be the standard 6-oz container for frozen juice concentrates in the 1960-61 season. This will amount to about 110 million cans.

In addition, private label customers of these processors will get their concentrates in cans with aluminum bodies and tinplate ends. This will total about 265 million cans.

Tin prices for the week: Nov. 30 —102.00; Dec. 1—102.00; Dec. 2 —102.00; Dec. 5—102.50; Dec. 6 —102.50*.

*Estimate.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in OCTOBER based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd Conn. Valley	30.00
Copper, Lake	30.00
Straits, Tin, New York	102.82
Zinc, E. St. Louis	13.00
Lead, St. Louis	11.80
Aluminum ingot	26.00

Note: Quotations are on going prices

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	30.80	33.00	10/11/60
Copper (CS)	30.00	31.00	10/13/60
Copper (L)	30.00	33.00	10/13/60
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium Ingot	38.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; Other primary prices, pg. 163.

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.088	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/4
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.13	.....	52.36	56.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	51.75	52.04	51.69	55.81
Brass, Red	52.62	52.91	52.56	56.68
Brass, Naval	54.08	60.39	47.89	58.24
Muntz Metal	52.14	.....	47.45	.....
Comm. Bz.	54.03	54.32	53.97	57.84
Mang. Bz.	57.82	.....	51.42	.....
Phos. Bz. 5%	75.70	75.70	76.20	77.63

Free Cutting Brass Rod..... 34.88

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6-75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb).... $1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9%, dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz..... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb..... 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz... $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 28.25
- No. 120 ..... 27.25
- No. 123 ..... 26.25

80-10-10 ingot
- No. 305 ..... 32.75
- No. 315 ..... 30.50

88-10-2 ingot
- No. 210 ..... 40.50
- No. 215 ..... 37.25
- No. 245 ..... 32.50

Yellow ingot
- No. 405 ..... 23.50

Manganese bronze
- No. 421 ..... 27.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type)..26.00-27.00
No. 12 alum. (No. 2 grade)...22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.)...24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

Steel deoxidizing aluminum notch bar granulated or shot
- Grade 1—95-97½% 23.75-24.75
- Grade 2—92-95% 22.50-23.50
- Grade 3—90-92% 21.50-22.50
- Grade 4—85-90% 21.00-22.00

(Effective Dec. 6, 1960)

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	20⅜	18⅜
Red brass	23¼	22½
Comm. bronze	24	23¼
Mang. bronze	19½	18⅜
Free cutting rod ends.	19⅝	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 25¼
- No. 2 copper wire 24
- Light copper 21¾
- *Refining brass 22
- Copper bearing material 21

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 24¼
- No. 2 copper wire 23½
- Light copper 21
- No. 1 composition 20¾
- No. 1 comp. turnings 20¼
- Hvy. yellow brass solids 15½
- Brass pipe 14½
- Radiators 16½

Aluminum

- Mixed old cast. ..... 12½—13
- Mixed new clips ..... 14½—15
- Mixed turnings, dry ..... 13 —14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

- No. 1 copper wire ..... 22 —22½
- No. 2 copper wire ..... 20½—21
- Light copper ..... 18½—19
- Auto radiators (unsweated).. 12½—13
- No. 1 composition ..... 17½—18
- No. 1 composition turnings... 16 —17
- Cocks and faucets ..... 13 —13½
- Clean heavy yellow brass ... 12¼—12½
- Brass pipe ..... 13½—14
- New soft brass clippings..... 13½—14
- No. 1 brass rod turnings .... 12½—13

Aluminum

- Alum. pistons and struts .... 6½— 7
- Aluminum crankcase ..... 8½— 9
- 1100 (2s) aluminum clippings 11½—12
- Old sheet and utensils ..... 8½— 9
- Borings and turnings ..... 4½— 5
- Industrial castings ..... 9 — 9½
- 2020 (24s) clippings ..... 10 —10½

Zinc

- New zinc clippings ..... 7 — 7¼
- Old zinc ..... 4 — 4½
- Zinc routings ..... 3 — 3¼
- Old die cast scrap ..... 2 — 2¼

Nickel and Monel

- Pure nickel clipping 52-54
- Clean nickel turnings..... 40
- Nickel anodes 52-54
- Nickel rod ends 52-54
- New Monel clippings 23-23.50
- Clean Monel turnings 16.50-17
- Old sheet Monel 22-23
- Nickel silver clippings, mixed. 18
- Nickel silver turnings, mixed. 15

Lead

- Soft scrap lead ..... 7¾— 8
- Battery plates (dry) ..... 3 — 3¼
- Batteries, acid free ..... 2 — 2¼

Miscellaneous

- Block tin ..... 75 —77
- No. 1 pewter ..... 57.50—58
- Auto babbitt ..... 43 —44
- Mixed common babbitt ..... 10¼—10¾
- Solder joints ..... 14½—15
- Siphon tops 41
- Small foundry type ..... 9¾—10¼
- Monotype ..... 9¾—10¼
- Lino. and stereotype ..... 8¾— 9
- Electrotype ..... 7½— 7¾
- Hand picked type shells ..... 5¼— 5¾
- Lino. and stereo. dross ..... 2¼— 2¾
- Electro dross ..... 2¼— 2¾

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Dec. 5, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		Prices are for .50 lb. base box for .45 lb. deduct 15¢; for .55 lb. add 15¢; for .60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

Hollowware Enameling
29 ga.—*7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.

* Electrogalvanized sheets.

(Effective Dec. 5, 1960)

†† 7.425 at Sharon; Niles is 7.225.

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*		7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Consbohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Dec. 5, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.,
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets: Hot-Rolled (10 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore**	$.10	7.87	9.71	10.16	10.78	8.44	9.13	8.65	11.90	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	.....	.....
Boston**	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.03	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver**		10.90	12.53	13.27	13.07	10.74	11.24	10.88	12.97	.....	.....	.....	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	9.65	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.50	11.42	10.95	11.76	9.43	9.93	9.57	11.77	17.17	15.87	21.87	21.12
Los Angeles**		9.59[1]	11.29	12.20	11.29	9.70	10.45	9.55	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.13	10.20	.....	11.39	8.81	9.16	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.59
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia**	.10	8.45	9.70	11.50	10.95	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.03	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	21.20	20.45
Portland**		9.45	11.30	12.35	11.45	9.60	10.80	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco**	.10	10.27	11.79[2]	11.50	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.75	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.84	10.99	11.16	8.83	9.33	8.97	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 8 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 1.3¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Dec. 5, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)

	Pct
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)

	Pct
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46
Machine Screws—bulk		
¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50–32.75	32.00	29.50–34.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25–31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mills

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Dec. 5, 1960)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld	Merch. Wire Galv.
	Col	Col	Col	Col	Col	¢/lb.	¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	156	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	...	193	9.00	9.55
So. Chicago *R3*	173	187	.....	...	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
Sparrows Pt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD ½ In. Blk.	½ In. Gal.	¾ In. Blk.	¾ In. Gal.	1 In. Blk.	1 In. Gal.	1¼ In. Blk.	1¼ In. Gal.	1½ In. Blk.	1½ In. Gal.	2 In. Blk.	2 In. Gal.	2½-3 In. Blk.	2½-3 In. Gal.	SEAMLESS 2 In. Blk.	2 In. Gal.	2½ In. Blk.	2½ In. Gal.	3 In. Blk.	3 In. Gal.	3½-4 In. Blk.	3½-4 In. Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2 75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	*6.25	.....	*2.25	.....	0.75	.....	1.25	.....	1.75	.....	2.25	.....	2.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

HOW LONG SINCE YOU CHECKED ON PERFORATIONS?

No matter what material your product demands Mundt can supply the exact perforation you need. Steel, brass, copper, monel, bronze, aluminum, zinc, tinplate, lead, stainless steel, coated metals, bonded materials, plastics, and paper are punched as required for every functional and ornamental need.

You can count on Mundt's guarantee that sheets are perfectly flat, straight, parallel on the sides, and free from buckle or camber.

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PERFORATING SPECIALISTS FOR ALL TYPES OF MATERIALS

stack-molding gives you lower-cost castings

This 2¼-pound gray iron casting is a generator part for an automotive electrical system.

COSTS were CUT by casting 60 at a time . . . 5 to a mold . . . 12 molds high.

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RELIABILITY . . . Uniformly high quality, with dependable composition and structure.

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HIGH STRENGTH . . . Heat-treating facilities available to provide any desired properties.

OVERNIGHT DELIVERY WITHIN 500 MILES

GL GREAT LAKES FOUNDERS & MACHINE CORP. LUDINGTON, MICH.

Specialists in Stack-, CO_2, and Shell-Mold Casting

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 65-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	33.25
0.05% C....	34.00	1.00% C....	33.00
0.10% C....	33.75	1.50% C....	32.75
0.20% C....	33.50	2.00% C....	32.50

3-5% C, 53-63% Cr, 2.5% max. Si... 26.00
4-6% C, 58-63% Cr, 3-6% Si..... 22.50
5-8% C, 58-63% Cr, 3-6% Si..... 22.50
6-8% C, 50-56% Cr, 4-7% Si..... 22.00
4.00-4.50% C, 60-70% Cr, 1.2% Si.. 28.75
0.025% C (Simplex) 35.00
0.010% C max, 63-66% Cr, 5-7% Si. 34.50
0.25% C max 33.50
0.010% C max, 68-71% Cr, 2% Si max 34.50
0.25% C max 33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	24.50	14.60
Ton lots	29.75	16.05
Less ton lots	31.35	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
16-19%	.. $98.00	$96.00	$100.50
19-21%	.. 100.00	98.00	102.50
21-23%	.. 102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.

Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe ..	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk 8.00
Ton lots, packed 10.30

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb...	2.40	3.30	4.55

(Effective Dec. 5, 1960)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.

Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb

Ton lots $3.45
Less ton lots 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $255.00

Ferrotungsten, ⅛ x down packed per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy

35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.. $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

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2303G North 11th St. • St. Louis 6, Mo.

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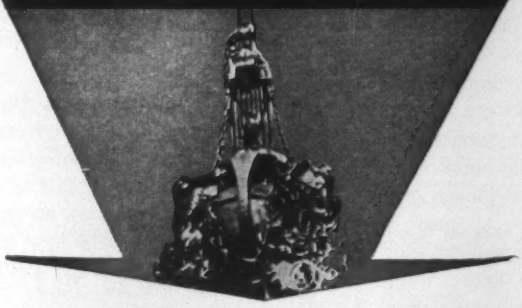
OWEN GRAPPLES



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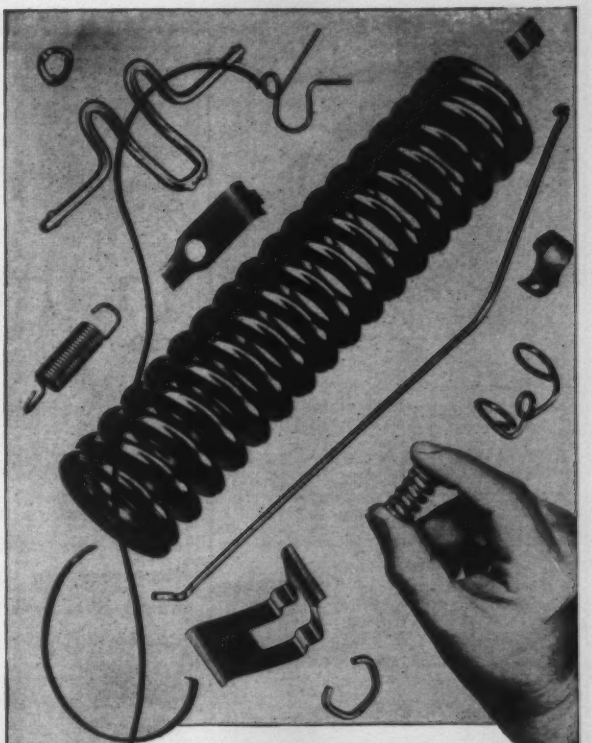
CANTON, OHIO



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GUARANTEED—RE-NU-BILT

Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	Speed
1	6000	G.E.	ATI .8P.F.	2200/6600	600
1	3500	G.E.	TS 1.0P.F.	4600/2300/4000	360
2	1750	G.E.	ATI	2300	3600
2	500	G.E.	TS 7569	2200	1200
1	400	G.E.	TS 7565	2200	1200
2	350	G.E.	ATI 1.0P.F.	2300	150
1	325	G.E.	ATI 1.0P.F.	440	1800
2	300	ElMach.	BRKT	2200	1200

SLIP RING

1	1750	G.E.	M-5798	4800	1800
1	800	Whse.	CW	500	1776
1	800	G.E.	MT-428	2300	450
1	600	Whse.	CW 4-32-D-15	440	1778
1	550	Whse.	CW	440	252
1	500	Whse.	CW	550	350
1	300	A.C.	ANY	440/2300	720
1	300	G.E.	MTP-561	2200	1800
1	250	G.E.	IM-16	220/440	875
1	250	Cr.Wh.	Size 29Q	2300	350
1	250	G.E.	MT-424Y	4000	257
1	200	G.E.	IE-13B	220	1800
2	200	Whse.	CW-890	2300	1775
1	200	G.E.	IM	2200	589
1	200	G.E.	IM	440	435
1	150	G.E.	IM-17	440	435
1	125	G.E.	MT-557	220/440	1200
1	125	A.C.	ARY	440	870
3	100	A.C.		440	695
1	100	G.E.	M-6335Z	220/440	580
1	100	Whse.	CW-754C	220/440	900

SQUIRREL CAGE

3	1500	G.E.	K	2200	3580
1	500	G.E.	FT-559AY	2200	3600
1	500	Whse.	CS-1115	2300	863/445
4	500	Whse.	CS-1216	2300	500
2	450	Ell.	F-3910	2200	1200
1	400	Whse.	CS-7151-610H	6600/4000	3565
1	300	Cont.	NL-6868	440	1780
1	300	G.E.	KT-559A	2200	1775
1	300	Whse.	CS-1002	2300	580
1	250	Whse.	CS-8758	2200	1775
2	200	Whse.	CS-8558	220/440	1750

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REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

DIRECT CURRENT MOTORS

Adjustable and Constant Speed

(Suitable for MILL and STANDARD DUTY)

QU.	HP	MAKE	VOLTS	R.P.M.
1	3000	G.E.	600	90/180
2-N*	3000	Whse.	600	600
2-N*	2700	G.E.	415	280
1-N*	2500	Whse.	700	108/162
1-N*	2200	Whse.	600	92/132
2-N*	2000	G.E.	230	230/350
2-N*	1750	G.E.	600	200/300
3-N*	1500	Whse.	600	300/700
2-N*	1400	G.E.	250	165/300
4- *	800	Elliott	230	700/1200
6-N*	750	Whse.	250	300/700
1	750	Whse.	250	200/400
2- *	650	S. & S.	300	1000/1350
1- *	600	Al. Chal.	600	300/600
1- *	600	Whse.	250	110/220
2- *	300	Whse.	230	300/600
2	235	Whse.	230	325/975
1	150	Whse.	230	400/1200
1	125	Whse.	230	450/1050
3	125	Whse.	230	350/1125
1-N*	100	Whse.	250	350/700

N-New, unused—* heavy duty, pedestal bearing.

MOTOR GENERATOR SETS

3 phase—60 cycle

QU.	KW	MAKE	R.P.M.	D.C. VOLTS	A.C. VOLTS
2	3500	Al. Ch.	514	700	13800/4160
1	2500	G.E.	514	700	13800/4160
1	2100	G.E.	514	250	4600/2300
1	1750	Whse.	720	600	4000/2300
1	1500	G.E.	514	250	4600/2300
1	1325	Whse.	720	600	4000/2300
1	1250	G.E.	450	265	4160
1	1000	G.E.	900	600	4000/2300
1	850	G.E.	720	250	4000/2300
1	750	G.E.	900	250	4000/2300
1	500	G.E.	1200	250	4000/2300
1	400	G.E.	1200	250	4000/2300
1	300	Whse.	1200	250	4000/2300
1	250	Whse.	1200	250	4000/2300
1	200	G.E.	1200	250	4000/2300
1	175	G.E.	1200	250	4000/2300
1	150	G.E.	1200	250	2300/440
1	125	G.E.	1200	250	2300/440

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Activity Is Slow In the Midwest

Used machinery dealers on a national level may ride a slight upturn to the end of 1960.

But dealers in the Midwest aren't this optimistic. In fact, they feel the situation may become even worse before it becomes much better.

▪ Recent reports from the Machinery Dealers National Assn. confirm earlier speculation that used machine dealers on a national level may end the year with a slight upturn. But dealers in the Midwest aren't that optimistic.

The most recent statistics show dollar sales in October were 12 pct higher than the sales in September. However, October's sales were 12.6 pct lower than the same month last year.

Generally, Midwest used machine dealers are doing no more than holding their own. And a number of them feel the market could drop again this month. Recovery in this area is not fully expected until sometime in the first quarter.

Inquiries Down—Late in September there were glimmers of hope for an active October. But a continued slip of inquiries doused this hope. For example, eight weeks ago there were a few rebuilders reporting a mild increase in inquiries. There was strong belief that these inquiries would develop into programs by mid-October. They still haven't materialized.

If anything, they're further in the future.

One dealer says, "Recently I took a swing through my territory. In most cases, customers still have capital appropriations they haven't spent. But they've decided, even though cash is in hand, to wait until the turn of the year before making any moves."

Same Old Story—This story is repeated over and over. There was one company that bucked the national trend and did more business in September than August. However, this dealer now says, "We did less business in November than we did in September. And we dropped in October. I've got a hunch we haven't hit bottom yet."

Hardest hit in the current slide are production tools. Tool room equipment, always a good-selling item, is still moving at a fair rate. But this general area shows no sign of recovery and many tool men are warning that further slips could come.

Slitting lines, roller levelers, and shears have also maintained a fair pace in sales, and press brakes are moving well. On the other hand, punch presses have slipped in sales.

Poor Money Situation — The money situation is bothering many dealers in the Midwest. They report that customers are delinquent on payments at a rate very nearly comparable to that of the "tight money" period in 1956-57. At the same time, prices are soft at the dealer level.

Used machinery men are sitting tight for the most part. A few new angles are being tested in an effort to increase business.

LIQUIDATION

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108 COKE OVENS New 1950
6 TON ELEC. BRIDGE 231' Span
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1—32" & 20" x 54" 3-HIGH SHEET MILL with motor drives screwdown and pre-set controls.
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4—29" 2'-HIGH HOT SHEET MILLS.
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1—28" COLD SHEET MILL TRAIN, 8 stands, 400 HP motor and drive.
1—10" x 24" STRIP MILL, 2-high, forged rolls.
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1—18" BAR MILL, 3-high, single stand.
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2—SQUARING SHEARS for ¼" x 138" sheets.
2—SQUARING SHEARS for 10 ga. x 120" sheets.
1—ROLLER LEVELLER, 1" x 144" plate.
4—LEVELLERS for sheets, 17 rolls, widths 48", 84", 68", 72".
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1—BILLETEER, size C, for conditioning billets from 3" to 12" square, up to 18' lengths.
1—SLITTER FOR SHEETS up to 144" wide.
1—CORRUGATING MACHINE for sheets 144" long, 3 sets of removable dies.
1—HALLDEN STRAIGHTENING AND CUTTING-OFF MACHINE, capacity 5/16" to ⅝" dia. x 14 ft
1—POINTER, tube 2" O.D. x ⅛" wall maximum.
1—1500 HP GEAR DRIVE, ratio 6 to 1.
1—1200 HP GEAR DRIVE, 295 to 30 RPM.
1—1200 HP GEAR DRIVE, 353 to 94.5 RPM.
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1—400 HP GEAR DRIVE, 8.2 to 1 ratio.
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1—600 HP MOTOR, 2300/4000 volts, 3 phase, 60 cycle, 450 RPM.
1—400 HP MOTOR, 440 volts, 3 phase, 60 cycle, 450 RPM.
1—400 HP MOTOR, 2300/4000 volts, 3 phase, 60 cycle, 450 RPM.
1—400 HP MOTOR, 2200 volts, 3 phase, 60 cycle 300 RPM.

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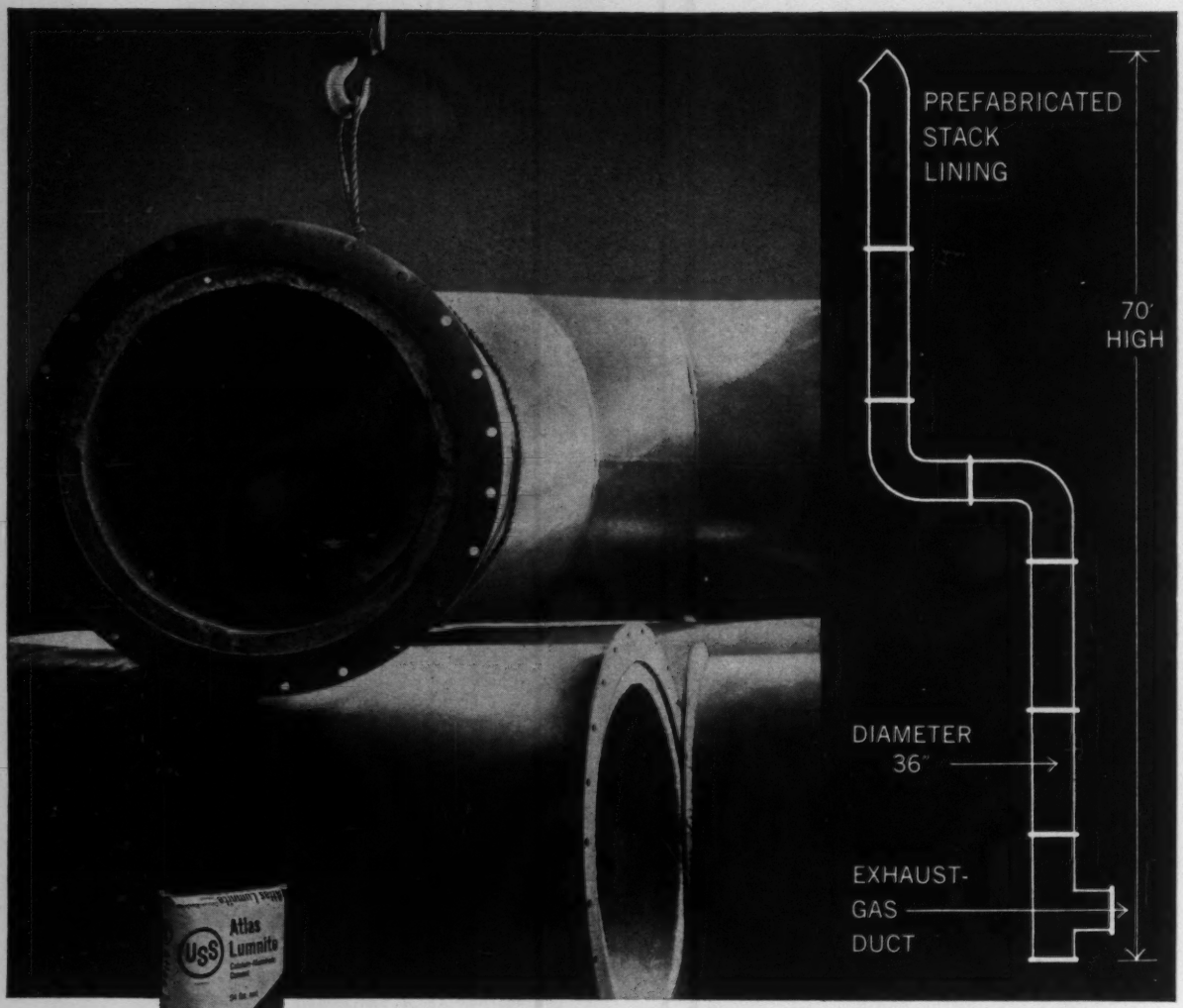

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L-202

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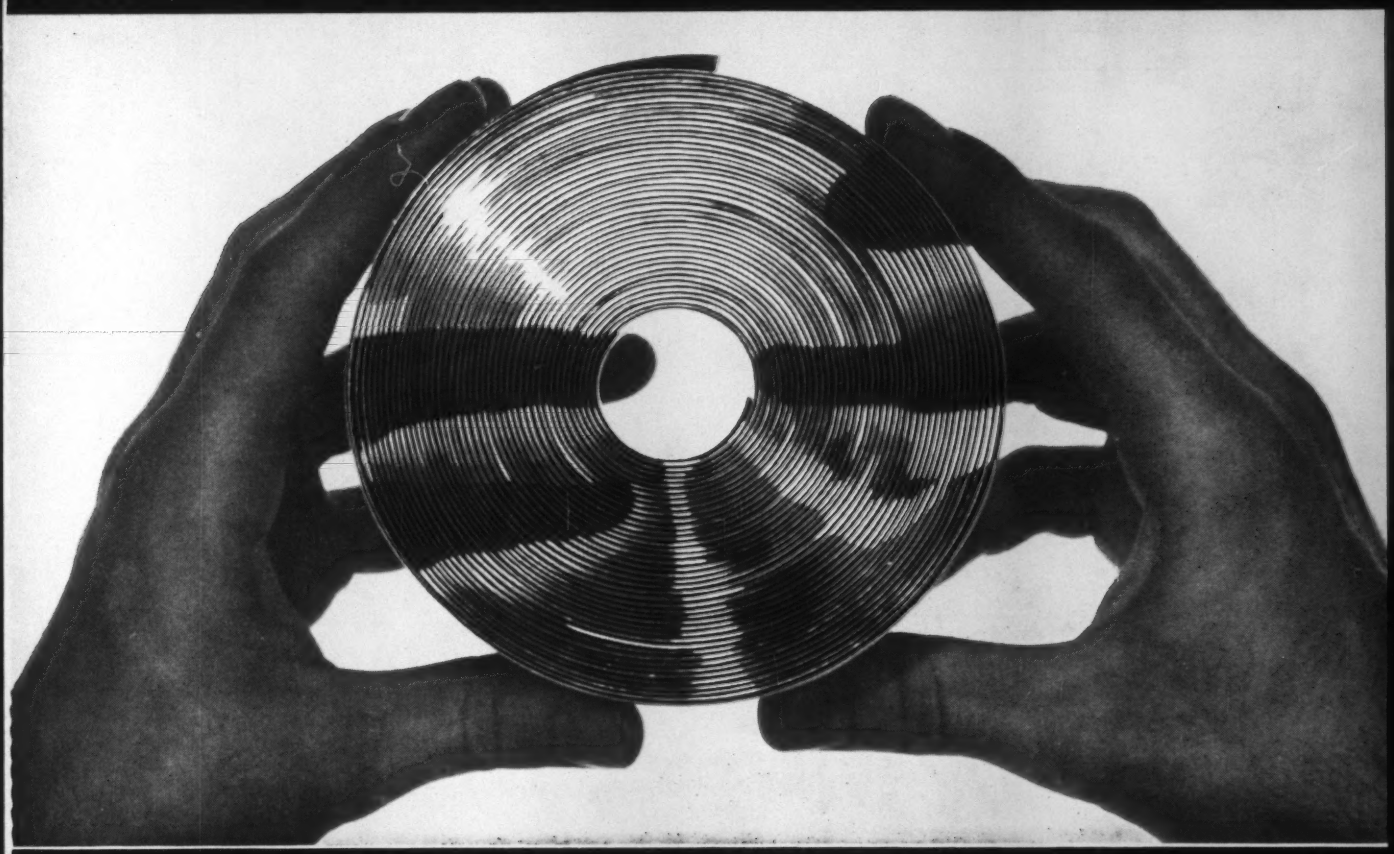

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